

BUREAU OF HYGIENE AND TROPICAL DISEASES

TROPICAL DISEASES
BULLETIN

Vol. 54]

1957

[No. 4

SUMMARY OF RECENT ABSTRACTS *

III. MALARIA †

[Continued from p. 259]

Treatment

A bulletin issued by the Ross Institute of Tropical Hygiene on anti-malarial drugs has been brought up to date (p. 715). COVELL (p. 150) sums up developments in the treatment of malaria during the last 40 years.

On an estate in West Africa BORODA (p. 279) estimated the cost of *Plasmodium falciparum* malaria and its treatment, over a period of 16 months, at £27 10s. 9d. per 100 patients when amodiaquine was used, and £31 8s. 10d. when chloroquine or mepacrine was used. The drugs were given as single doses, repeated only if symptoms or parasitaemia persisted.

No very significant new work on antimalarial drugs has been reported. Quinine still has a value in certain circumstances, and WINCKEL (pp. 972, 973) refers to the use of hydrochloride for injections. The formulae he gives are less irritating than solutions of the dihydrochloride. CHAUDHURI *et al.* (p. 280) used a synthetic analogue of febrifugine (from *Dichroa febrifuga*) and an alcoholic extract of the roots of this plant, in *P. falciparum* and *P. vivax* malaria. The results were poor.

RAY *et al.* (p. 973) found the active metabolite of bromoguanide useful in a few patients with *P. vivax* or *P. falciparum* malaria.

In Mexico Azacrin proved satisfactory as a schizontocide, but had no direct action on gametocytes; GUTIÉRREZ BALLESTEROS *et al.* (p. 280) report some relapses of *P. vivax* after its use.

* The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1956, v. 53. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

† For previous articles on malaria in this series see the March and April issues of the *Tropical Diseases Bulletin* each year since 1939.

FUHRMANN and KOENIG (p. 714) show that chloroquine diphosphate is absorbed more readily than the sulphate and other salts, and the base itself. Solubility in water is not the only factor concerned.

Amodiaquine continues to receive favourable notice, and EDESON *et al.* (p. 15) advocate a single dose of 600 mgm. of the base, with correspondingly reduced doses for children, for the treatment of *P. falciparum* and *P. vivax* malaria in Asian patients in Malaya. In the Sudan ABBOTT (p. 150) also used it successfully for *P. falciparum* malaria. He found pyrimethamine unsatisfactory for *P. vivax*, though probably useful in suppression. On the other hand, in India Inder Singh (p. 403) treated *P. vivax* and *P. falciparum* malaria with pyrimethamine, the most satisfactory dosage being 150 mgm. daily on 2 successive days. Fever subsided in 2-3 days; there were no relapses within the observation period of 80 days.

Experiments in rats with excessive doses of pyrimethamine indicate that they cause both depression of haematopoiesis and direct haemolysis (ZACH, p. 855).

Careful experiments with volunteers indicate that primaquine has a strong action on the early tissue forms of *P. falciparum* which is at its maximum on the 3rd day after sporozoite infection, but that by the 9th day the tissue forms develop a high degree of resistance. ARNOLD *et al.* (p. 854) found it most unsatisfactory against circulating blood forms of the parasite, and conclude that it should never be relied upon to control parasitaemia in non-immune subjects without concurrent suppressive therapy. ALVING *et al.* (p. 14) gave quinine or chloroquine concurrently with primaquine in the treatment of *P. vivax* infection, and the results suggest that the action of primaquine was potentiated by this simultaneous use of the other two drugs.

For the treatment of *P. vivax* malaria acquired in Korea HALL and LATTS (p. 402) found pentaquine and quinine better than chloroquine alone, in that no relapses occurred in the 49 patients treated, but they think that a combination of chloroquine with pentaquine or primaquine might be better.

LYSENKO and other Russian workers (pp. 16, 17) describe Chinocid, an 8-aminoquinoline, which they have used successfully for the treatment of *P. vivax* malaria. Details are given of dosage for treatment of the acute attack, and for prevention of relapses, and a note is made that the drug is well tolerated.

A compound of the quinazolone series (1698 L) was found by EDESON and WILSON (p. 537) to be quite unsuitable for the treatment of *P. falciparum* or *P. vivax* infections.

Suppressive Treatment

Malaria has declined in a remarkable way in Martinique since 1935, when drug prophylaxis was started on a large scale. MONTESTRUC (p. 142)

notes that no parasites have been found for 2 years; insecticidal sprays have been used since 1951, but though beneficial, can hardly have been important factors in the remarkable regression which has taken place.

Proguanil is used on a large scale. In Netherlands New Guinea control consists of its use together with larval control. BLACK (p. 153) states that the vectors are *Anopheles punctulatus*, *A. farauti* and *A. karwari*, and that a pilot DDT scheme has been started. For New Guinea, GUNTHER (p. 1089) considers that widespread control is possible only by residual insecticides, but he uses drug prophylaxis for some non-immunes, and favours proguanil for this. For non-immune New Guineans working in endemic areas he prefers treatment of the actual attacks to drug prophylaxis. This allows immunity to be built up. SPENCER (p. 1402), commenting on Gunther's paper, states that people in the highlands are not immune; the endemicity is low and the disease is unstable, with long periods of quiescence and occasional abrupt epidemics. For these highland village communities suppressive treatment combined with an efficient medical service and prompt treatment of attacks will go a long way towards ultimate control. Such a programme could be put into action far more readily than residual spray campaigns.

Pyrimethamine proved useful as a suppressant of malaria in children in a small village in Jordan when given once each week for 18 weeks (ALICATA and DAJANI, p. 538).

In a hyperendemic zone of Liberia MILLER (p. 281) gave suppressive drugs to African children, and concluded that monthly administration appeared to be practicable, and that if the risk of drug resistance can be overcome, perhaps by the addition of chloroquine, pyrimethamine might be the drug of choice. Pyrimethamine given each week for a limited period (5½ months) to African children in Angola was successful in reducing parasite and spleen rates, compared with controls (CAMBOURNAC *et al.*, p. 281).

In Brazil, PINOTTI *et al.* (p. 853) use chloroquine base in common salt for treatment of hospital patients, and find that a daily dose of 0.03 gm. is enough to control *P. vivax* and *P. malariae* infections. They (p. 853) use it also for the general population as a measure of control, and report a reduction of the parasite rate to zero in a few months after daily doses of 0.045 or even 0.03 gm. They find this a satisfactory means of prevention.

For the suppression of malaria in Asian adults on a rubber estate in Malaya EDESON *et al.* (p. 16) advocate 400 mgm. amodiaquine base every 2 weeks.

In the inmates of a leprosy institution in Netherlands New Guinea, who were receiving treatment with sulphones, LEIKER (p. 1092) found a remarkable freedom from malaria, though the area was holo-endemic. He thinks that the DDS used for the treatment of leprosy may have some suppressive effect on malaria.

Control

General

RUSSELL (p. 947), in a series of masterly lectures, traces the history of investigations into the aetiology and transmission of malaria, and of the development of modern methods of prevention. The account is the product of long personal association with malaria research, and profound study. The author's attitude to control is optimistic, and though he recognizes the population problems which may attend success in malaria control, he thinks that they can be overcome by proper care and forethought. In a long paper published by WHO, PAMPANA and RUSSELL (p. 18) review the distribution and importance of malaria in the world, and discuss the activities of various international organizations in attempting to control it. They make the point that complete eradication of the vector is not the recommended goal, though it has been achieved in places; elimination of the parasite by sufficiently prolonged interruption of transmission (which may be achieved if the vectors are greatly reduced though not eradicated) appears to be possible and has been achieved in some areas. They are hopeful about the Americas, Europe, Australia and much of Asia, but the situation in Africa is not so promising.

LESHCHENKO (p. 1406) gives a brief general account of malaria control in the Ukrainian republic.

KRUSÉ and LESACA (p. 28) discuss the automatic siphons in use in the Philippines for the control of the stream-breeding vector, *A. minimus* var. *flavirostris*.

Insecticides

A bio-assay method for the estimation of insecticide residues is described by ELLIOTT (p. 1405), who used it in Nigeria.

BRUCE-CHWATT (p. 1406) discusses the subject of mosquito resistance to insecticides, and its genetics. It is a threat to the success of control measures throughout the world. BUSVINE (p. 857) determined the normal resistance levels of *A. gambiae* to various insecticides, using strains maintained in London, so that the results could be used for comparative purposes. In Northern Nigeria ELLIOTT and RAMAKRISHNA (p. 857) found evidence of resistance to dieldrin in an area in which it had been used since 1954; there was only a very doubtful resistance to DDT in the dieldrin areas. LIVADAS (p. 539) considers that in Greece the resistance of *A. sacharovi* to DDT has extended to other chlorinated hydrocarbons, and to other areas, and that *A. superpictus* is also showing signs of acquiring resistance. Experiments indicate that a mixture of dieldrin and Diazinon would be the most appropriate insecticide to combat an epidemic uncontrollable by other means, and the author remarks that other means of controlling malaria, particularly the use of drugs, should be considered. Spray programmes should be suspended as soon as possible after the end of transmission, to avoid the development

of resistance [for instance in *A. sundaicus*, see below, Second Asian Malaria Conference].

In Europe the use of residual insecticides has been very successful, though KRAAN (p. 855), who reports very great reduction of malaria in the Netherlands, remarks that similar reductions have occurred before, when deliberate attempts at control were not used. The DDT campaign is now limited to selected houses thought to be foci of dissemination of the disease. In Sicily malaria has been almost eradicated since DDT was used, but *A. maculipennis labbranchiae* persists, though no longer as a house-haunting species (GRASSI and ODDO, p. 398). In Greece the object of house spraying is now to be limited to maintaining a low level of malaria for as long as possible, and BÉLIOS (p. 20), who mentions the occurrence of resistance to DDT, thinks that cessation of spraying can be envisaged only if transmission fails to occur for several seasons.

In Israel SALITERNIK (p. 974) points out that formerly there were 4 important vectors—*A. claviger*, *A. sacharovi*, *A. superpictus* and *A. sergenti*—and that since the application of DDT the semi-domestic *A. sergenti* is the main vector. Malaria in Turkey is usually a seasonal disease transmitted by *A. sacharovi* and *A. superpictus*; the season is long on the coast and in the foothills, and shorter in the mountains. KRATZ and BRIDGES (p. 1220) give an account of the malaria control organization and state that the use of DDT has led to impressive progress in terms of spleen rates and morbidity. No resistance has been noted in the anophelines.

Malaria in the steppe, submontane and Zagros-montane areas of Iraq is described by PRINGLE (p. 403), who shows that *A. superpictus* and *A. sacharovi* are the important vectors, though *A. fluviatilis* and *A. pulcherrimus* are found in some places. Perennial irrigation affords conditions favourable for intensive breeding, and elsewhere seasonal breeding in springs and natural seepages provokes the serious summer epidemics. The results of residual spray campaigns have been irregular where the people tend to sleep out of doors, but encouraging elsewhere, especially in the mountains, where the transmission season (by *A. superpictus*) is relatively short. But the development of resistance to insecticides is feared.

Old methods of malaria control have for many years been very successful in North Africa but FARINAUD (p. 1092) thinks that the use of insecticides could lead to improvement, and should be extended in spite of past mistakes in technique and some psychological opposition from the people. For malaria in Morocco the control measures include larvicidal and drainage work, strict control of rice cultivation, mass chemoprophylaxis, and mass treatment during epidemics, but antilarval methods were unsuccessful against *A. m. labbranchiae* growing in rice fields; DDT residual spray twice during each malaria season was successful (HOUEL, pp. 23, 856). It was also successful in controlling malaria in army units in Morocco (LE RENARD, p. 24).

In Kenya BURNETT (p. 976) observed an increase in the effectiveness of BHC and dieldrin in treated houses at the onset of the rainy season. If the rising humidity is responsible for this it may mean that a spray routine suitable for a hot moist climate may be unsuitable for dry areas in the same country, and that misleading results are possible in tests of persistence of insecticides or in detecting resistance, unless conditions are standardized with regard to humidity.

CHRISTIE and WEBBE (p. 975) find, under laboratory conditions, that the MLD of DDT in acetone-water suspension for larvae of *A. gambiae* is about 0.06 p.p.m., for dieldrin the concentration is 0.01 p.p.m. For oil solutions the MLD is about 0.001 lb. per acre for dieldrin and 0.02 for DDT.

For Central Africa, where *A. gambiae* is the important and intractable vector, MERLE (p. 974) makes the point that control campaigns should be organized on a large scale, involving coordination of activity between nations, if they are to be successful. The multiplication of small schemes, with a variety of insecticides, and without natural boundaries, is strongly deprecated.

WEBBE (p. 540) has used pellets containing 1% dieldrin for treating ponds, and reports that 10 oz. of these pellets per acre, applied weekly for 8 weeks, completely suppressed the breeding of *A. gambiae*.

BRUCE-CHWATT *et al.* (p. 21) give an account of the experimental malaria control scheme at Ilaro in Southern Nigeria, which was originally a holo-endemic area. Residual spray with BHC during 3 years reduced *A. gambiae* to very small numbers, and *A. funestus* was eradicated. Malariometric data indicate that there was a moderate decrease in malaria though entomological data would have suggested a much greater decrease; the reason for incomplete success was partly that the African population was unexpectedly mobile, that anophelines came into the area from outside, and that the dose of insecticide was not effective for 3 months. In comment Macdonald makes the point that transmission was not brought below the critical level, and that the decrease in transmission was balanced by loss of immunity. A small increase in the efficiency of the technique used might have completely stopped transmission.

In the northern part of the French Cameroons, where the climate is dry with a clear-cut rainy season, the use of residual spray has been very successful, but in the middle and southern zones MORIN (p. 1093) shows that conditions are very different from the north. Spraying methods have been tried, and he concludes that BHC was ineffective because of its brief residual effect, but that DDT was effective, though its value cannot be assessed fully until it has been used for several years. Selective spraying, based on the finding that mosquitoes rarely rest below $2\frac{1}{2}$ metres from the ground, was as successful as complete spraying [see, however, RAFI, below]. Up to 1951 the measures used in Brazzaville were antilarval, but since then residual spray (3 times each year) and prophylactic medication have been added; MERLE and MAILLOT (p. 151),

however, do not think that the disease can be eradicated in this city where infiltration by anophelines and infected Africans is constant, though it is very greatly reduced.

In a control experiment with residual BHC and DDT on a sugar estate in East Africa WILSON (p. 24) found that only with applications of 2 gm. or more of BHC per square metre would house-catches of *A. gambiae* be reduced effectively for as long as 3 months. Reduction of this order was accompanied by substantial reduction in the parasite rate of the workmen (who were usually on 6-month contract only). The author concludes, however, that under these conditions little benefit can be expected from applications of this kind in limited areas. In Southern Rhodesia ALVES and BLAIR (p. 540) remark that BHC spray is used, and that for financial reasons a barrier zone was created to protect the country against invasion by *A. gambiae* from the low-lying river valleys. If the barrier scheme proves to be a success the treatment of the whole potentially infective population with gametocytocidal drugs will probably be considered, but the large numbers of migrant African labourers constitute a difficulty.

Malaria control has been very successful in Madagascar, but eradication of all vectors has not been possible, and cessation of all control measures would be hazardous. BERNARD and GOULESQUE (p. 25) have used Sautet's index (which they cite) as a guide in estimating the hazards of recrudescence.

The Second Asian Malaria Conference (p. 1219) accepted the eradication of malaria as the ultimate goal. Full control has been achieved with DDT against *A. minimus minimus* in some areas and the prospects against *A. m. flavirostris* are now held to be good. *A. leucosphyrus leucosphyrus* and *A. balabacensis* need further study and possibly other methods for control. Resistance to insecticides has been reported in *A. sundaius* in some places where the insecticides have been used as larvicides; chemically related insecticides should not be used simultaneously against both larvae and adults of the same species except in emergency.

In Mysore BHOMBORE *et al.* (p. 542) observed evidence of an excitatory and repellent action of DDT on mosquitoes, but they may have picked up a lethal dose before becoming excited and repelled. The repellent effect of BHC was much less. MOHAN (p. 282) reports that sublethal doses of DDT had little effect on the maturation of eggs in the ovaries of *A. fluviatilis* and *A. stephensi*, but although gravid females were not prevented from ovipositing, a proportion laid eggs indiscriminately instead of into the water provided. DDT interfered with mating in partly paralysed mosquitoes.

RAFI and RASHID (p. 1094) report on the insecticide control scheme which has been in progress in a district of the Punjab for several years; the incidence of the disease and the prevalence of mosquitoes show a slow decline. RAFI (p. 1403) found that both *A. culicifacies* and *A. stephensi* tend to rest uniformly throughout the height of the walls of rooms; it is therefore advisable to spray the entire walls. [See MORIN, above.]

An extensive field study of the effectiveness of DDT, BHC and dieldrin as residual sprays was undertaken in various parts of India by RAJINDAR PAL *et al.* (p. 26) and VISWANATHAN *et al.* (p. 26). The vector mosquito was *A. culicifacies*. Various preparations were used, and the insecticides were applied in various concentrations. The authors conclude that dieldrin 12.5 mgm., DDT 50 mgm. and BHC 10 mgm. (gamma isomer) per sq. ft. were equally effective, and that the effect lasted 7-8 weeks. A single dose of dieldrin (14 mgm. per sq. ft.) at the beginning of the malaria season was effective, as were one or two doses of DDT (112 mgm.). BHC at 11 mgm. was effective for only 6 weeks. In the extensive Damodar Valley industrial and agricultural development scheme, India, where malaria is a serious problem, control is attempted by residual insecticides, but HENDERSON (p. 858) describes the more conservative precautionary measures being advised in the construction of barrages on the assumption that insecticides may not be the permanent answer to the problem. In the large labour force engaged in building the Bhavani dam in India malaria was successfully controlled by extensive use of DDT, at an annual cost of 0.26 to 0.68 rupee *per caput* (SUBRAMANIAM, p. 152).

In Mysore NARAHARI RAO and BHOMBORÉ (p. 1407) have observed an increase in the amount of land under cultivation with rice, and an increase in yield per acre, contemporaneously with the decrease in malaria accompanying the control campaign, and they attribute most of this increase to the effects of that campaign. The cost of control is only a minute fraction of the increased wealth it brings. In the Terai area CHAKRABARTI (p. 1407) shows that as a result of control there has been extensive settlement and cultivation in previously almost uninhabitable areas.

In trials of BHC residual spray and suppressive drugs for the control of malaria on an estate in Malaya, WALLACE (p. 1316) eventually preferred to use a combination of both methods.

In Netherlands New Guinea, where *A. koliensis* and *A. farauti* are important, VAN THIEL and METSELAAR (p. 154) showed that although 3-20% of these mosquitoes escaped the lethal effect of DDT, none escaped the effect of dieldrin.

Until recently there has been no effective control of rural malaria in the South-West Pacific area, though in urban areas larval control has been carried out. BLACK (p. 1094) states that delay in starting insecticide campaigns has been due to doubts about the habits of *A. punctulatus*, but it is now known that this mosquito does rest in houses, and a pilot scheme with DDT indicates that it can be very well controlled. Elsewhere dieldrin is likely to be used.

SOPER (p. 282) discusses in general terms the problems and prospects of eradication of malaria from the Western Hemisphere, and ALVARADO (p. 283) describes the organization of the campaign in certain of the countries concerned. Malaria has been eradicated, or almost eradicated,

from Argentina, parts of Ecuador, Venezuela, British Guiana and French Guiana. GABALDON (p. 284) points out that in Venezuela the reduction of malaria was accompanied by great reduction in deaths from intestinal infections (as a result of destruction of house-flies), and in the general death rate. This improvement involves marked modification of the age distribution of the population.

BURGESS (p. 970) was unable to find that sublethal doses of DDT had any direct effect on *P. vivax* or *P. falciparum* developing in *A. quadrimaculatus*. It is possible, however, that mosquitoes experiencing such doses may never take another blood meal. In Puerto Rico (p. 977) the incidence of malaria has been reduced almost to nil as a result of the use of residual spray with DDT since 1944. The vector was *A. albimanus*.

DEHNÉ (p. 543) traces the history of malaria control in the Panama area during the past 50 years. DDT residual spray has been very successful in part of Colombia, where *P. falciparum* has been completely eliminated; RONNEFELDT (p. 19) remarks that the local vectors, *A. darlingi* and *A. albicans*, were fully susceptible to DDT. CONCHA Y VENEGAS (p. 544) gives a list of the anophelines of Colombia, and reports favourably on the DDT campaigns.

The DDT campaigns in Ecuador have reduced malaria to insignificance (MONTALVAN, pp. 29, 1095), but premature slackening of effort (for financial or other reasons) might result in the development of resistance of the vectors to DDT. In Venezuela there has been a decline in mortality in the former malarious areas, since the introduction of residual spray control measures, but there has also been a decline in the malaria-free areas. GABALDON (p. 1317) found the decrease in the formerly malarious areas to relate largely to persons under 20 and elsewhere to those over 20. At the end of the 6th year of intensive insecticidal work in French Guiana FLOCH (p. 155) reports the elimination of *Aedes aegypti* and a 98% reduction in malaria. DDT, BHC and chlordane were used. The death rate has been much reduced and the birth rate increased. *A. darlingi* and *A. aquasalis* have been almost eliminated. He (p. 542) points out that elimination had apparently been achieved in French Guiana, but that in 1954 several hundred cases occurred in immigrants from the Antilles and in the local population of the area in which these people settled.

In 1940 the number of people in Brazil suffering from malaria was about 6,000,000, but COSTA and DE BUSTAMANTE (p. 275) now estimate that there has been a reduction to about 3% of that figure, as a result of the insecticide spray work and the drug prophylaxis carried out through the very numerous centres established in the country. In the city of Santos, Brazil, transmission of malaria formerly took place at a low rate, but CODA and RAMOS (p. 544) report that since DDT was used systematically, transmission has ceased, and *A. tarsimaculatus* has been eliminated. DDT has reduced malaria to nil in the Federal District, Rio de Janeiro (PINTO, p. 859).

At a large hydro-electric plant in Brazil protection against malaria was achieved in part by clearing the edges of the dam water, and then by the use of residual DDT spray, but SÁ (p. 859) shows that the final elimination of *A. darlingi* occurred when the level of the water was lowered periodically, exposing bare areas free of vegetation round the margin.

FERREIRA and AZAMBUJA (p. 1096) noticed that after the use of DDT anophelines of the subgenus *Kerteszia* were captured much more frequently on outside walls of houses than on inside walls, though the reverse was true before.

In Chile a house-spraying campaign with DDT has proved successful against *A. pseudopunctipennis*, which NEGhme *et al.* (p. 858) state to have been practically eliminated except for specimens passively transported into the country.

Malaria of Mammals and Birds

Parasites of Monkeys. FULTON and GRANT (p. 1096) report a careful study of the sulphur requirements of the erythrocytic form of *P. knowlesi*, and MENON and NAIR (p. 157) report haematological changes in rhesus monkeys infected with this parasite. NAIR *et al.* (p. 157) found that proguanil was much more active than its metabolite in rhesus monkeys infected with the Nuri strain of *P. knowlesi*, and that there were indications that resistance to the metabolite was occurring. Bromoguanide and its active metabolite exert a slow effect on infection with this strain, but NAIR and RAY (p. 1319) show that the quinine equivalent of each is low. They (p. 404) tested chloroquine diphosphate and sulphate, and amodiaquine, against the same strain; the therapeutic effect was much the same in all. They (p. 405) also tested sulphadiazine and other drugs.

RODHAIN and DELLAERT (p. 860) successfully passed *P. schwetzi* from a chimpanzee to man on several occasions. They found that, after cure, 2 of the patients responded to infection with *P. vivax*, but that one reaction was modified, suggesting some degree of immunity. They still thought that *P. schwetzi* and *P. vivax* were separate species.

Plasmodium berghei. A cytochemical study of *P. berghei* is reported by SEN GUPTA *et al.* (p. 285). FULTON and SPOONER (pp. 546, 1097) studied the biochemistry and nutrition, including respiratory metabolism, of *P. berghei*, on which much more information is needed. The preferred host cell is the reticulocyte, and interpretation of results is difficult owing to the active carbohydrate metabolism of the reticulocyte. Details should be sought in the original papers.

In attempts to find new mosquito hosts for *P. berghei*, RODHAIN *et al.* (p. 409) succeeded in infecting *A. maculipennis* from young hamsters. They (p. 410) were unable, however, to infect rats and other rodents from these mosquitoes, either by bite or by injecting ripe oöcysts containing sporozoites. Attempts by CELAYA *et al.* (p. 1221) to infect *A. quadrimaculatus*, *A. freeborni*, *A. bradleyi*, *Culex fatigans* and *Aedes aegypti* with *P. berghei* failed. Gut infections were obtained with *A.*

quadrifasciatus fed on infected mice (especially on the second or third day of infection) but at that stage the infection collapsed.

In white mice inoculated intraperitoneally with *P. berghei*, ARCOLEO and CARRESCIA (p. 286) found that the prepatent period was shorter with heavy doses than with light doses, but that the quantity of infection did not affect its course. Although in general the severity of the infection is correlated with the number of basophilic cells in the blood, its course may be accelerated if production of these cells is diminished and a massive invasion of normal erythrocytes takes place.

Blockade of the reticulo-endothelial system with Indian ink usually promotes parasitaemia by lowering the resistance of the host to the malaria parasite, but LOXLEY (p. 407) found the opposite effect in mice infected with *P. berghei* one day after injection of heavy doses of Indian ink.

GREENBERG (p. 861) attempted to ascertain whether there was any relationship in hybrid and backcross mice between the degree of infection with *P. berghei* of mature red cells at the end of the first week and the probability of death from toxæmia. He concludes that the higher the infection of mature erythrocytes the shorter the life of the mice.

FABIANI and ORFILA (pp. 407, 547) noticed that about 40% of mice infected with *P. berghei* die with symptoms of shock early in the infection and even in the absence of heavy parasitaemia. They found that this also happened in mice deprived of the suprarenals though the effect could be partly prevented by administration of desoxycorticosterone acetate. In malaria of mice there is normally a drop in the number of eosinophils in the blood, but not in animals deprived of the suprarenals. The authors conclude that the suprarenals have an important effect on the reaction to infection. JACKSON (p. 408) found that cortisone, given shortly before and again shortly after infection of rats with *P. berghei*, has a dual effect. It retards the infection and increases survival time, but it also produces an increased mortality rate.

Work by CHAKRABARTI (p. 716) indicates that in castrated male rats the peak of *P. berghei* parasitaemia is higher than in intact rats; susceptibility is apparently affected by the sex hormones.

SINGER and TRAGER (p. 1098) found that during *P. berghei* infections of rats the coenzyme A concentration in the liver fell, though since the liver itself became enlarged the total amount was unaltered. The formation of coenzyme A is probably correlated with innate immunity, and the ability to form it may determine survival. VON BRAND and MERCADO (p. 718) have continued work which showed a reduction in the synthetic power of the liver in starving rats infected with *P. berghei*, when given various sugars.

Having observed seasonal variation in the course of *P. berghei* infections in mice (the resistance of mice to *P. berghei* being greater in spring and summer than in autumn and winter, in the south of France) FAURE (p. 30) found that the period of survival of the mice was directly

correlated with the length of the incubation period and with the degree of parasitaemia, which was low in infections of short duration and high in prolonged cases.

NADEL *et al.* (p. 406) have been able to in-breed mice to produce strains resistant to *P. berghei* and strains less resistant. They now show that resistance has a genetic basis involving multiple gene factors, but the wide range in the time of death points to the existence of undetermined non-genetic factors also.

SERGEANT and PONCET (p. 405) inoculated a large number of mice and rats with *P. berghei*. The infection was fatal in all the mice, whether introduced intraperitoneally or subcutaneously; the adult rats showed much innate resistance, most of them recovering. In both mice and rats the infection caused a severe reduction in the number of red blood cells and an increase in the size of the spleen. These authors (p. 717) have demonstrated the existence of latent infection in a proportion of rats after recovery (*infection latente métacritique*). In other rats the infection may be latent from the beginning (*infection latente d'emblée*). They show that subinoculation of blood into clean animals is a much more delicate test than blood examination for the presence of parasites. SERGEANT (p. 1098) shows that although most rats inoculated subcutaneously with *P. berghei* experience a definite attack, a few do not, though subinoculation of their organs into other rats reveals (latent) infection; they are in a state of premunition. SERGEANT and PONCET (pp. 1099, 1318) infected rats with *P. berghei* and at various periods afterwards re-inoculated them with the same strain; most showed immunity but a few reacted severely, as if sensitized by the first infection. The shorter the interval between the two inoculations the greater the resistance. Infected rats treated with chloroquine to destroy any remaining parasites proved largely resistant to re-inoculation, and this may represent immunity different from premunition (which depends on the persistence of the parasites) but the authors admit that the drug does not always sterilize the infection, which may remain in a latent form.

In general, parasitaemia and survival in rats infected with *P. berghei* are inversely related to age, and there are corresponding differences in the degree of parasitaemia. SINGER *et al.* (p. 409) suggest that parasitaemia is limited by the availability of reticulocytes (which the parasites definitely prefer), but with increasing age of the host the infection is effectively controlled by the immune response. In young animals immunity is ineffective and reticulocytes continue to maintain the high level of parasitaemia until the host dies.

In experiments with *Cricetomys ansorgei* and *Thamnomys surdaster* DE SMET and FRANKIE (p. 30) were able to demonstrate immunity after infection with *P. berghei* (by blood or sporozoite inoculation), to both homologous and heterologous strains of the parasite. DE SMET (p. 156) found that the ratio of total proteins to globulins in infected mice (in which the infection is usually fatal) was similar to that in control mice,

whereas in rats and *Cricetomys ansorgei* (which are usually resistant) the ratio was considerably or markedly decreased.

Rats infected with *P. berghei* show increase in the proportion of gamma globulin in the blood at the time of the parasitolytic crisis (CORRADETTI *et al.*, p. 288).

WERNER (p. 1221) concludes from his investigations that congenital infection with *P. berghei* probably does not occur, and BRUCE-CHWATT and GIBSON (p. 862) confirm its rarity. They show that immunity is transmitted through the milk of immune rats and mice, and only slightly *in utero*. In ungulates the comparable immunity is transmitted in colostrum and milk, in man, rabbit and guineapig transplacentally, and in rats and mice from both sources. For rats TERRY (p. 861) shows that the protection afforded by milk from an immune mother disappears after weaning. Antibodies can be demonstrated in the serum of immune mothers, and young rats can absorb antibodies through the gut; human infants are unable to do this, and they probably receive their antibodies *in utero*.

The effect of milk diet has been studied. CARRESCIA (p. 287) demonstrated some advantage in terms of longevity in young white mice, though all the animals eventually died; some adults on milk diet survived while taking it, but died when returned to the usual diet. DURAND and MATHIS (p. 406) could not find any benefit from placing mice on a milk diet 10 days before infection, and SAUTET and CAPORALI (p. 155) found that a milk diet had little or no effect, though SAUTET *et al.* (p. 156) showed that in mice treated with various antimalarial drugs a milk diet gave an advantage over the ordinary diet. CORRADETTI *et al.* (p. 287) could find no protective effect from a milk diet, with or without PABA, on infected rats. Undetected but variable factors probably account for the different results obtained in such experiments.

COLBOURNE (p. 716) recalls the fact that for *P. berghei* the protection afforded by a milk diet is lost if PABA is administered. To some African children in Accra he gave yeast daily, to supply PABA, and to controls he gave cod-liver oil. Results seemed to show rather more malaria in the yeast group, but the numbers were small.

In rats infected with *P. berghei* treatment with antihistamine caused a rise in parasitaemia, and histamine produced the opposite effect; PAUTRIZEL and MARTRENCHAR (p. 408) attribute the action of histamine to stimulation of the macrophages and therefore greater destruction of the infected red cells.

Experiments on mice infected with *P. berghei* indicate that red wine interferes with growth of mice, and if taken in sufficient quantity, with treatment by means of quinine (SAUTET, p. 863).

YOELI *et al.* (p. 977) show that infection with West Nile virus has a marked interfering action on the course of *P. berghei* infection in white mice.

RESSELER (p. 1408) has isolated *P. inopinatum* n.sp., from a rat

caught in Belgium, this differs from the other rat plasmodia *P. berghei* and *P. vinckei*, both of which occur in West Africa.

Parasites of Birds. GLENN and MANWELL (p. 721) discuss the cultivation of certain bird malaria parasites *in vitro*, and the effect of heterologous sera and the addition of metabolites. The original should be consulted for details.

Various species of *Aedes* are susceptible to infection with *P. gallinaceum*, but MOHAN (p. 158) shows that the most efficient vector is *Armigeres obturbans*, which is very suitable for experimental observations. JASWANT SINGH and MOHAN (p. 159) found that *Culex bitaeniorhynchus* was highly susceptible to *P. relictum* but refractory to *P. gallinaceum* and *P. falciparum*. TERZIAN *et al.* (p. 1222) found that the susceptibility of *Aedes aegypti* to infection with *P. gallinaceum* diminished with age, but could be restored by giving a blood meal to old mosquitoes 7 days before the infecting meal. This was not so if separate components of blood were used, and it seems that there must be some labile factor in whole blood which exerts the effect, and that it is not merely due to replenishment of nitrogenous loss.

BISHOP and McCONNACHIE (p. 1101) have studied the factors affecting the emergence of gametocytes of *P. gallinaceum* from erythrocytes, and the exflagellation of male gametocytes. The factors examined include CO₂ (which tends to inhibit), O₂ (which is not an essential), pH (inhibitory when low) and plasma (which plays some part). There may be a factor or factors in plasma which are activated, possibly by diffusion of CO₂ from blood when it is drawn.

TALIAFERRO *et al.* (p. 410) studied the reactions of connective tissue in chickens infected with *P. gallinaceum* and *P. lophurae*, and the glucose metabolism during the initial infections. The abstracts should be read in full.

CORRADETTI (p. 545) gives an account of his work on comparative pathology and immunology in malaria of birds and monkeys, mentioning the use of a new technique—repeated brain biopsies—in the study of *P. gallinaceum*. The endothelial cells in this infection become immune to the tissue forms of the parasite, but the development of this immunity is upset if splenectomy is performed while exo-erythrocytic schizogony is still occurring. He discusses immunity in rats and monkeys and suggests that parasites living in erythrocytes have a greater chance of escaping the effect of immunity than those living in tissue cells.

To investigate the fate of sporozoites of a species of *Plasmodium* in animals not adapted to the development of that species, RAFFAELE (p. 1100) inoculated sporozoites of *P. gallinaceum* into canaries, rats and chicks (controls). The sporozoites were not damaged by plasma, and remained in the blood for varying periods; like other foreign bodies they were taken up by phagocytes, in which their fate was determined—they either developed or were destroyed. He finds it difficult to believe that the sporozoites of parasites of primates find their way by some special

tropism direct to the host (liver) cells, in a manner different from the sporozoites of avian parasites.

Studying the anaemia in fowls infected with *P. gallinaceum* CARRESCIA and LIOY (p. 1102) show that it is correlated directly with parasitaemia.

BISHOP (p. 1102) could not find that quinine and pyrimethamine had any potentiating effect on each other in chicks infected with *P. gallinaceum*, though other authors had reported such an action. Working with a strain of *P. gallinaceum* resistant to pyrimethamine, GREENBERG and BOND (p. 719) found that resistance to several related compounds was also increased. They discuss several points which are still unexplained in this connexion. TAYLOR and GREENBERG (p. 547) found that meta-chloridine and sulphadiazine showed greater activity in chicks infected with *P. gallinaceum* and fed on a purified diet than in those given the stock diet. The greater activity of sulphadiazine was probably due to deficiency in PABA, but this does not explain the activity of meta-chloridine, which is probably inhibited by substances other than the protein and fatty constituents of the stock diet.

SOBÉRON Y PARRA and PEREZ REYES (p. 720) found that a combination of primaquine and pyrimethamine was more effective in the treatment of *P. relictum* infections than any other drug combination, and suggest its use in man.

DEMINA (p. 863) describes the tissue stages of *P. relictum*.

Hypoxia reduces acquired (and also natural) immunity to *P. cathe-merium*, and HUGHES and TATUM (p. 719) now show that after a few days with reduced oxygen tension the activity of primaquine is reduced in infected birds. Administration of cortisone had a similar effect.

KHABIR and MANWELL (p. 549) report studies on the glucose consumption of *P. hexamerium*.

Working with *P. lophurae*, TRAGER and SINGER (p. 548) have observed an *in vitro* antimalarial effect of parapyruvic acid.

LEFROU and MARTIGNOLES (p. 285) report *Hepatocystis kochi* from a high proportion of baboons in French Guinea. Charles Wilcocks

MALARIA

In this section abstracts are arranged as far as possible in the following order:—Human malaria—epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control; Animal malaria—monkeys, other animals, birds.

WARTENA, B. Het malariaprobleem in Friesland. [**Malaria in Friesland**] *Nederl. Tijdschr. v. Geneesk.* 1956, Nov. 17, v. 100 (iv), No. 46, 3337–42, 4 figs. English summary (5 lines).

The annual incidence of malaria in Friesland has fallen from 716 cases in 1946 to 3 cases in 1955. The breeding of *Anopheles maculipennis*

atroparvus is favoured by salt water, and data concerning the salt content of surface waters made available by the water authority of the province have made it possible to recognize those areas in which mosquito eradication measures should be carried out. Maps are given to show the extent in 1951-54 of the areas in which the salt content of the water was 1 and 2 gm. per litre respectively. [See also this *Bulletin*, 1953, v. 50, 87.]

D. J. Bauer

SALITERNIK, Z. [The Problem of Malaria in Israel] *Dapim Refuim*. Tel-Aviv. 1956, Oct.-Nov., v. 15, No. 4 [in Hebrew 296-8. English summary iv-v].

The English summary appended to the paper is as follows:—

“During the 35 years of antimalarial work in our country we have compiled parasitological, entomological and statistical facts in order to establish the presence of the different malarial parasites, the seasonal course of morbidity, different strains of *Anopheles* mosquitoes serving as vectors of malaria, the density of their population, their longevity of life, their zoophilic and anthropophilic characteristics, their age, percentage of infected mosquitoes, distance of flight in the different seasons, etc.

“In the different climatic conditions in our country from the North to the South, and from one place to another, 14 different strains of *Anopheles*, of them four important as active vectors of malaria, have succeeded in developing. On account of the activity of these four vectors the curve of new malaria cases showed in the past two climaxes: in spring and in autumn. Nowadays, having succeeded in suppressing three of these vectors, there remains only one malarial climax—in the autumn.

“In the early setting of this country, large numbers of non-immune immigrants from European countries settled among an endemic or hyper-endemic population, which resulted in malaria epidemics among the newcomers.

“After the establishment of the State of Israel, we witnessed the opposite manifestation. Thousands of malaria parasite carriers came from eastern countries of high malaria endemicity to Israel, which had been virtually cleared from this disease. Thus, the older population was endangered.

“Nevertheless, we consented to disperse the hundreds of thousands of newcomers throughout the country. Moreover, we decided not to take any personal protective measures by newcomers or by the older population. Nowadays mosquito nets are not used. Window and door nets are even less used. Rarely are special clothes against mosquitoes worn. Personal protective measures are used in restricted cases, and only by persons moving to places, where malaria has not yet disappeared. We permitted ourselves to act in this way because we trust in the measures which we had taken against the *Anopheles* mosquito.

“From the establishment of the State of Israel (1948) up to now, there

is an enormous fall in the morbidity of malaria. In the year 1949 there were 1094 new cases i.e. 1.04 cases in 1000 persons. In the year 1955—91 new cases, i.e. 0.05 cases in 1000 persons. However fatal cases from malaria have not stopped occurring. It seems that we do not evaluate fully the fatal results from tropic malaria to non-immune persons.

“The land boundaries of Israel are more than 1000 km. long, and the Anopheles mosquito does not recognise boundaries set by man. In order to prevent the intrusion of infected mosquitoes cooperation with our neighbours is needed.

“We are happy that use of the new insecticides and other ways of fighting the Anopheles mosquitoes had enabled us to lower the morbidity of malaria to a very low level and by way has served to destroy insects causing other diseases such as: Dengue, Papatasii fever, Leishmaniasis, Oriental sore etc.

“Nowadays we are on the way from the state of strict control of malaria, to a phase of completely clearing the country of this disease.”

PEÑALVER, L. M. & MARTINEZ QUEHL, R., with the collaboration of J. A. RODRIGUEZ. El diagnostico del paludismo en el medio hospitalario. Consideraciones sobre los casos registrados en el Hospital Rosales de 1949 a 1954. [**Diagnosis of Malaria in Hospitals. Observation on Registered Cases in the Hospital Rosales, El Salvador, in 1949–1954**] *Archivos Colegio Med. de El Salvador*. 1956, Mar., v. 9, No. 1, 1–18, 1 fig. & 4 graphs.

A knowledge of the number of cases of malaria in an area is important both in undertaking control measures and in evaluating the results of it. Hospital records should provide especially accurate records, but often such records are not in fact complete.

The authors, from El Salvador, made a critical analysis of the data on malaria recorded in the Hospital Rosales, the largest in that country, between 1949 and 1954.

The records and their implications are discussed very fully under the general headings of incidence, basis of diagnosis (epidemiological, clinical and parasitological), together with the difficulties and perplexities which may attend the use of these criteria. The findings are shown in 4 tables and 4 charts and accompanied by a map in which the endemic areas in the country are indicated.

During the 6 years under study 1,016 cases of malaria (1.2%) were recorded by clinical diagnosis among 84,088 patients attending the hospital. The percentage fell from 3.08 in 1949 to 0.45 in 1954, as a result of control measures. Only 200 (19.6%) were confirmed parasitologically. Of these 51% were *P. falciparum* and 49% *P. vivax* infections. Corresponding figures obtained by the Antimalaria Service among the general population were 16% and 74%, with 1.2% *P. malariae* and 8.1%

mixed. This discrepancy is explained by the fact that because of the greater severity of *P. falciparum* infections, the patients are more likely to go to hospital.

Tables show the percentage of conditions diagnosed as malaria in 540 cases, in 9 clinical groups; the diagnosis made in 30 cases of malaria clinically simulating other conditions; and 22 symptoms or syndromes commonly met with in malaria.

The figures, charts and discussion of the various aspects of diagnosis form a valuable contribution to the critical study of malarial incidence, detection and evaluation, and underline the necessity for accurate parasitological diagnosis.

H. J. O'D. Burke-Gaffney

TRAGER, W. **The Intracellular Position of Malarial Parasites.** [Correspondence.] *Trans. Roy. Soc. Trop. Med. & Hyg.* 1956, July, v. 50, No. 4, 419-20.

The revival of the controversy regarding the position of the malaria parasites in relation to the host erythrocytes [this *Bulletin*, 1956, v. 53, 1210, 1211] has prompted the author to provide further evidence of their intracellular position. Thus, when viewed by phase contrast microscopy, the avian and human parasites appear as bright bodies within the dark red cell, owing to the lesser density of the parasite cytoplasm within the concentrated haemoglobin solution surrounding it. Extrusion of the parasites from the host-cell can be observed in hanging drop preparations. At the edges of these, conditions are like those in a slowly drying thin film, and the erythrocytes "pop", releasing the parasites. Unlike the intracellular parasites, the free parasites are less bright and soon become darker than the background. In the case of *Plasmodium lophurae* merozoites were observed both leaving and entering erythrocytes.

C. A. Hoare

ŁUKASIAK, J. Występowanie ras gatunku *Anopheles maculipennis* Meig. 1818 na terenie Polski ze szczególnym uwzględnieniem Warszawy i okolic. [**The Appearance of Races of the Species *Anopheles maculipennis* Meig. 1818 in Poland with special reference to Warsaw and its Vicinity**] *Przegląd Epidemiol.* Warsaw. 1956, v. 10, No. 4, 357-67, 2 figs.

The English summary appended to the paper is as follows:—

"The writer gives an historical outline of investigations on the appearance of the species and races of *Anoph. maculipennis* in Poland with emphasis on the work of Polish writers. The writer has caught insects in Warsaw (in various districts) and the close vicinity of the town, as well as in some other localities in Poland. (During 1952 and 1953, a total of 36 localities and districts was examined.) The existence of characteristic seasonality in the appearance of winged forms was confirmed.

"In Warsaw, 89 per cent of the mosquitoes found were of the race *A. messeae* and 11 per cent were *A. typicus*. In certain districts of the town and localities more distant from Warsaw, the race *A. typicus* reached 60 per cent. The period of development for a generation of *A. typicus* lasts about 32 days, and so is markedly shorter than that for *A. messeae*.

"It should be noted that in general the race *A. messeae* is predominant in Poland. The *A. atroparvus* race has been ascertained along the shores of the Baltic, in Inowroclaw, and in Rokitnica (Weyer, Lachmajerowa).

"The importance of this kind of investigation is stressed on account of the constant notifications of sporadic cases of malaria and other diseases carried by mosquitoes."

[See this *Bulletin*, 1951, v. 48, 859; 1953, v. 50, 183.]

NEOGY, B. P. & KACHROO, P. **Observations on Association of Aquatic Vegetation with Anopheline-Breeding within Damodar-Eden Canal Area of West Bengal.** *Indian J. Malariology*. 1956, Sept., v. 10, No. 3, 183-97, 1 map, 8 figs. on 2 pls. & 3 charts.

HODGKIN, Ernest P. **The Transmission of Malaria in Malaya.** *Studies from Inst. Med. Res. Federation of Malaya*. No. 27, pp. viii + 98, 7 figs. 1956. Kuala Lumpur. [\$5.00(M); \$1.65 (U.S.); 11s. 8d.]

This monograph gives a useful summary of the *Anopheles* mosquitoes of Malaya in relation to the transmission of malaria, and covers the period when the author was working in the peninsula (1931 to 1942). The earlier records are briefly referred to in order to throw light on some particular question, and the introduction contains a short historical account of the subject. The introduction also describes the locality and inhabitants, and lists some 30 species of *Anopheles* found in Malaya, many of which are now subdivided into subspecies or closely related species. Such taxonomic research has been of great value in clearing up various epidemiological mysteries, like the absence of malaria in the presence of the light-winged form of *A. barbirostris* and its prevalence where the dark-winged form predominates. This systematic work is by no means at an end, and closer differentiation of the *hyrcanus* complex, for instance, may well elucidate other problems.

The second section of the book gives an account of investigations made on different estates, towns, or rural districts throughout the country, and covers larval surveys and the collecting of adult mosquitoes. A special feature of the Malayan *Anopheles* is that no species are house-haunting, and thus the usual methods of ascertaining the density of adults are inapplicable. Instead, the human bait trap was largely used. The results of dissections of mosquitoes were based on the examination of midguts and salivary glands within 48 hours of capture. Precipitin tests were done on stomach contents. In addition, the malaria incidence is given in an

abbreviated form, which unfortunately omits the rates for different age-groups. Some of these surveys have been published in detailed form elsewhere; the relevant figures of all the surveys are given in a series of tables at the end of the book.

The third section of the monograph deals with the vector status of the different species, all of which can be experimentally infected with malaria. The following species are natural vectors: *maculatus*, "*umbrosus*" (so named originally but probably containing *letifer* and *baezai* also), *letifer*, *umbrosus*, *barbirostris*, "*hyrcanus*", *sundaicus*, *baezai*; the following probably do not transmit malaria in Malaya: *aconitus*, *karwari*, *kochi*, *philippinensis*, *separatus*, *subpictus malayensis*, *tessellatus*, *vagus*. The vector species show low infection rates; sometimes they are in such density, however, that a single species may give rise to 9 to 12 "infective bites" a year. If old specimens are selected for dissection (on the basis of the state of the wing fringe) the sporozoite rate may be very high, e.g., 20% in *A. baezai*. It is possible that the infection in this and other forest mosquitoes (e.g., *A. umbrosus*) may sometimes be of non-human origin.

Finally, the "topography of transmission" is considered, and each geographical region is considered separately. Malaria is absent above 5,000 feet; below that, the principal vector in the country is *A. maculatus*, except in the coastal plains, where, in fresh-water breeding-places, *A. barbirostris*, *letifer* and *umbrosus* assume importance, or in salt-water breeding-places, where *A. sundaius* becomes the chief vector.

This book will undoubtedly prove of great value to entomologists in the future, presenting information in a concise form of the *Anopheles* situation in Malaya up to the Japanese occupation in 1942. P. C. C. Garnham

ТЧАКМАКОВ, А. [Le paludisme comme cause de la mortalité foetale et des accouchements prématurés] [**Malaria as a Cause of Foetal Death and Premature Births**] *Acta Facultatis Med. Skopiensis*. Skopje. 1954, v. 1, 55-62. [In Macedonian.] French summary.

A description is given of the post-mortem findings on 20 stillborn infants of mothers suffering from malaria; the examinations were carried out in 1938-41 in Skopje, Macedonia. The commonest cause of death was asphyxia. The liver showed fatty degeneration and malarial pigment was present in the Kupffer cells and also in the spleen; no parasites were seen. There were signs of aspiration of amniotic fluid. In an examination of the blood of the mothers *Plasmodium vivax* was found in 5 and *P. falciparum* in 10 instances. The placenta was oedematous, with infarcts, necroses and haemorrhages; malarial pigment was present but parasites were found only in 1 instance. Detachment of the placenta and haemolytic anaemia of the foetus were also seen in 1 instance. The placental damage was sufficiently extensive to cause foetal anoxia, which

probably led to the initiation of respiratory movements and inhalation of liquor.

In the period under review malaria was present in 60 of 3,850 (1.5%) parturient women observed by the author; 5 of 40 infants carried to term were stillborn and 2 died in the neonatal period, and 15 of 20 born prematurely were stillborn and 5 were incapable of survival.

D. J. Bauer

JENKINS, H. G. **Congenital Malaria in England—*Plasmodium ovale*.**
Brit. Med. J. 1957, Jan. 12, 88-9.

"A case of congenital malaria due to *Plasmodium ovale* in an infant delivered by caesarean section is reported.

"Successful treatment with chloroquine sulphate and proguanil is described.

"The history of malarial infection of the mother enabled the correct diagnosis of congenital malaria to be made.

"The danger of the condition being mistaken for an early pulmonary infection is discussed."

MCGREGOR, I. A., GILLES, H. M., WALTERS, J. H., DAVIES, A. H. & PEARSON, F. A. **Effects of Heavy and Repeated Malarial Infections on Gambian Infants and Children. Effects of Erythrocytic Parasitization.** *Brit. Med. J.* 1956, Sept. 22, 686-92, 5 figs. [13 refs.]

This article records the results of a study carried out in Gambia from June 1951 to October 1954. During this period two groups of children were observed from birth. Children of one group were protected against overt malaria by weekly chloroquine, the others were given no antimalarial prophylaxis. In all other respects the two groups were comparable, and dispensary treatment, including chemotherapy for overt malaria, was available for both groups who were thus treated in the same way dietetically and therapeutically as other local children not participating in the experiment. Children in both groups were visited weekly by a nursing sister, monthly by a medical officer and finally were fully investigated.

Initially there were 26 members in each group but at the end the numbers participating had dwindled to 20 protected and 13 unprotected children. Five of the unprotected and 1 of the protected died during the first 16 months, and movement of parents then reduced the numbers of those continuing under observation still further, but no more deaths occurred.

In the unprotected group of 13 at the end of the experiment the incidence of malarial parasites was as follows: *P. falciparum* 13, *P. malariae* 8, *P. ovale* 1.

Records during the experiment showed that the average weight curves of unprotected children were doubtfully lower than the protected, but the

mean haemoglobin levels were much lower. At the end of the experiment both groups appeared to be equal in general physique and mental acuity. There were no marked nutritional differences. The unprotected children differed from the protected in that all showed considerable enlargement of the liver and spleen. One unprotected child with *P. malariae* infection exhibited the signs of nephrosis. The mean serum globulin level was higher in the unprotected group. Both groups showed a raised erythrocytic sedimentation rate, the mean figures being 31.1 and 50.84 [presumably mm./1 hour] respectively for the protected and unprotected groups. Hookworm and *Ascaris* ova were each found in 11 of the protected children and in 5 of the unprotected.

The causes of death of the 5 unprotected children during the first 16 months were not known and the small numbers in the experiment limit the significance of the apparent differences, but the general conclusion is that hyperendemic malaria in Gambia increases the risk of death during the first 2 years of life but subsequently causes little morbidity in the unprotected.

[An interesting sequel would be to record the subsequent fate of the protected group, if regular prophylaxis ceased at the end of the experiment. Further observations on this subject are required, for it is the increased mortality rates in the unprotected (rather than death from cerebral malaria) which is the crucial issue and whether such deaths can be avoided if prophylaxis is subsequently abandoned. See also this *Bulletin*, 1950, v. 47, 677; 1953, v. 50, 57, 596.]

Frederick J. Wright

PASSOS, J. Notas sobre o paludismo pernicioso na criança. [**Notes on Pernicious Malaria in Infants**] *Anais Inst. Med. Trop.* Lisbon. 1956, Mar.-June, v. 13, Nos. 1/2, 109-12.

This is a note concerning 41 young children with pernicious malaria who were treated in the Children's Dispensary at Benguela, Angola, between 1944 and 1952. Ten of the patients were under one year of age; 30 were from 1 to 4 years of age and 1 was aged 7 years. The clinical form of the disease was cerebral in 38 patients, algid in 3. *Plasmodium falciparum* was responsible for 37 cases, *P. vivax* for 3; one case was a mixed infection of both species.

The patients were treated with intramuscular quinine. There were 34 recoveries.

Norman White

ROTHE, H. **100 Cases of Cerebral Malaria.** *East African Med. J.* 1956, Oct., v. 33, No. 10, 405-7.

Among the indigenous people of the hyperendemic area in Kenya, where the author works, cerebral malaria occurs almost exclusively

between the age of 5 months and adolescence. Thirty-three of the series of 100 cases occurred between 5 and 12 months of age. Before chloroquine was used the mortality rate was high, 14 of 16 patients dying, in spite of parenteral antimalarial drugs, in the years 1949 and 1950. Since 1951, 84 patients have been treated; death from malaria occurred in only 2 late cases. It is gratifying to find that this result can be achieved when an intramuscular chloroquine salt is used for the younger children in whom intravenous therapy may be difficult. In older children, when the intravenous route is used, it is necessary to give chloroquine slowly to avoid a sudden drop in blood pressure. The dose used intramuscularly was 60-75 mgm. of chloroquine base, repeated after 1 hour and followed by oral chloroquine for a few doses. Chlorpromazine 50-100 mgm. was used as a sedative.

Frederick J. Wright

RAY, A. P., BASU, P. C., MISRA, B. G. & NAIR, C. P. **Therapeutic Response to Single Doses of Chloroquine Diphosphate in Human Malaria.** *J. Indian Med. Ass.* 1956, Nov. 1, v. 27, No. 9, 317-19. [11 refs.]

"A total of 64 cases were treated with a single dose of chloroquine diphosphate. The dosage schedules adopted were 0.45 g. of base (3 tablets) for 49 cases of *P. vivax* and 7 cases of *P. falciparum* and 0.6 g. of base (4 tablets) for 18 *P. falciparum* cases.

"In vivax malaria, relief of clinical symptoms was attained in 98 per cent within 48 hours and in 100 per cent within 72 hours. Asexual parasite clearance was recorded in all cases within 48 hours.

"Therapeutic response to 0.45 g. of chloroquine in falciparum malaria was found to be somewhat slower than 0.6 g. as relief of clinical symptoms within 48 hours was observed only in 57 per cent under the former and 100 per cent under the latter regime. During the same period, asexual parasite clearance was observed in 71 and 88.8 per cent of cases, respectively."

[See this *Bulletin*, 1954, v. 51, 140.]

AGARWAL, S. L. & ARORA, R. B. **Anticholinergic Actions of Chloroquine and Camoquin on Smooth and Cardiac Muscles.** *Indian J. Med. Res.* 1956, Oct., v. 44, No. 4, 631-6, 4 figs. [19 refs.]

"1. Chloroquine and camoquin inhibit the spontaneous activity of the small intestine.

"2. Camoquin causes mild slow constriction of the tracheal muscles.

"3. Chloroquine and camoquin have a negative inotropic action.

"4. Chloroquine and camoquin possess anticholinergic actions on cardiac and smooth muscles

“ 5. Chloroquine and camoquin block the cardio-inhibitory action of peripheral vagus stimulations in anaesthetized dogs.”

JINDAL, M. N. **Effects of Quinine, Proguanil and Chloroquine on Cardio-Vascular Responses of Adrenaline and Acetylcholine in Dogs.** *Indian J. Med. Res.* 1956, Oct., v. 44, No. 4, 649-55, 7 figs.

VAIDYANATHAN, N. & RAO, P. V. **Quinine Amblyopia treated with ACTH.** *J. Indian Med. Ass.* 1956, Nov. 1, v. 27, No. 9, 319-21.

“ A case of quinine amblyopia is presented and the pathogenesis of amblyopia is discussed.

“ The immediate response to vasodilators raised hopes but progress came to a standstill soon after.

“ Administration of ACTH appears to have hastened the recovery.”

CLYDE, D. F., SHUTE, G. T. & PRESS, J. **Transfer of Pyrimethamine in Human Milk.** *J. Trop. Med. & Hyg.* 1956, Dec., v. 59, No. 12, 277-84.

Milk samples for the chemical determination of pyrimethamine were obtained from lactating mothers after treatment with 25, 50 or 75 mgm. of the drug by mouth. The method of estimation used was essentially that of BRODIE *et al.* [this *Bulletin*, 1947, v. 44, 793]. It was found that the concentration of the drug or its derivatives in milk reached a peak 6 hours after dosage, and fell to less than half the peak amount after 24 hours. The amount excreted was not proportional to dosage. Mice with established *P. berghei* infections were given 2 to 2.5 ml. daily of the sample of pyrimethamine-containing human milk obtained up to 24 hours after dosage of the human patients.

An inhibitory effect on parasitaemia was observed only when administration was started at the time of inoculation. In breast-fed infants whose mothers had received a dose of 75 mgm. pyrimethamine orally followed by one of 50 mgm. some days later, all 4 types of human malaria parasites were observed. It was estimated that after the larger dosage 3.4 mgm. were ingested per child within the 48 hours after dosage. Parasites were completely eliminated in infants up to 6 months who were entirely breast-fed, but not in infants above this age who were partly breast-fed.

It is concluded that treatment of infants with pyrimethamine in mothers' milk is not satisfactory, but in prophylaxis the method may be of value.

J. D. Fulton

BLANC, F. Le traitement du paludisme. [**Treatment of Malaria**] *Maroc Méd.* 1956, Nov., v. 35, No. 378, 1112-33.

A review.

LA FACE, Lidia. Battista Grassi e la redenzione di Fiumicino dalla malaria. [**Battista Grassi and the Redemption of Fiumicino from Malaria**] *Rendiconti Istituto Superiore di Sanità.* Rome. 1956, Vol. 19, Pt. 10, 869-79.

[See this *Bulletin*, 1919, v. 14, 301; 1921, v. 17, 293.]

MSANGI, A. S. **Cetyl Alcohol and Larval Mosquito Control.** *East African Med. J.* 1956, Sept., v. 33, No. 9, 353-6.

It is proposed to use cetyl alcohol to check the evaporation of water from dams and other water reservoirs in Tanganyika. The author reports on field and laboratory experiments carried out to see if cetyl alcohol could be poisonous to mosquito larvae and pupae or in any way affect the free spread of oil solutions of larvicides.

The observations indicate that cetyl alcohol has no ill effects on the aquatic stages of the mosquito. It retards initially the spread of Malariol HS larvicide but soon the cetyl alcohol dissolves in the oil, which then spreads and exerts its full larvicidal effect.

W. Z. Coker

COLLINS, C. P. **Experiments in Larvae Control in H.M. Naval Base, Singapore.** *J. Roy. Nav. Med. Serv.* 1956, v. 42, No. 4, 148-66. [10 refs.]

Mosquito control has always been a problem at the Naval Base, Singapore, since its inception in the 1920's. The whole area presented a breeding ground for every type of local mosquito. In 1932 the changing topography through jungle clearance and construction of the Base led to the formation of countless brackish pools which bred *Anopheles sundaicus*. The occurrence of several thousand cases of malaria within a few months was followed by consistent hard field work with the end result that by 1939 the anopheline breeding had been almost eliminated. After the Japanese left in 1945 drains were found to be blocked, overflowing sewers had been purposely diverted to provide nightsoil for vegetable growing, bucket latrines and their vicinity had been used indiscriminately and left uncleaned, while refuse of all kinds remained without disposal. As a result, flies and nuisance mosquitoes abounded, though fortunately *Anopheles* species remained in the minority. Since that time the main

control efforts have been directed at the destruction of breeding places either by the removal or treatment of standing water. The larvicide of choice has remained antimalarial oil made up locally by the Naval Health Department from furnace and diesel oil. Limited quantities of 5% DDT in kerosene, kerosene itself for wells, and DDT bricks for ponds or pools, have been used. At the same time the Health Department has been responsible for the maintenance of 51 miles of antimalarial drainage in an overall area of about 9 square miles.

The value of the antimalaria work carried out by the Naval Health Department is judged socially, not by the absence of malaria, but by the presence of nuisance mosquitoes. A description is given of field experiments to control culicine breeding with various formulations including DDT briquettes, Malariol HS, Shell Malariol Emulsion, etc. DDT bricks have been found effective for ponds where it is inadvisable to destroy the vegetation with antimalarial oil. Malariol HS is used for fish ponds.

Later Shell Malariol Emulsion replaced the time-honoured antimalarial oil mixture with good results. Then a trial was given to the emulsion concentrate of dieldrin, known as Dieldrex. Over a period of 9 months careful checking for mosquito breeding was maintained by specially trained larva collectors. After 6 months' use of dieldrin pupae were reported in treated sites in increasing degree and adult mosquitoes were about in numbers not noted for years. The conclusion was that the mosquitoes themselves were losing their susceptibility to dieldrin. Later tests showed that, on cessation of the insecticide, this acquired resistance was to a great extent lost after a lapse of a year or the passage of some 10 generations.

In September 1955 it was necessary to discover if the increasingly poor control around the Naval Base was due to the onset of resistance and if so how quickly it was emerging and to what extent. Trial of different dieldrin dilutions were made against 2 strains of *Culex fatigans*, one obtained from within the Naval Base and presumably resistant, and a second from outside the Base where larvicidal treatment with dieldrin had not been used. These experiments confirmed that active resistance to dieldrin had been established in the Naval Base area; in consequence antimalarial oil had been re-introduced for larvicidal control.

This paper requires careful reading and evaluation and gives very useful data on costs in the field of the various formulations used. As a result of the various tests described methods of choice have been established, based on relative costs and adequate control. R. Ford Tredre

HAWKINS, W. B. **The Joint Action of DDT and Ethyl Alcohol upon Anopheline Larvae in Bioassay Suspensions.** *J. Econom. Entom.* 1956, Aug., v. 49, No. 4, 433-5, 2 figs.

There are several factors known to affect the evaluation of larvicide tests for anophelines. These include the number of larvae per test, the stability of the test suspension which for DDT depends on the ionic environment in the suspension, and the volume of the test suspension [this *Bulletin*, 1953, v. 50, 87]. In this report it is shown that the amount of DDT solvent, ethyl alcohol, used to produce the suspension also exerts an effect on larval kill.

The LD₅₀ of *Anopheles quadrimaculatus* larvae in DDT suspensions containing 1.0, 0.1 and 0.01% ethyl alcohol increases by a factor of 2 with each 10-fold decrease in alcohol concentration. In other tests larvae were conditioned to alcohol by exposure to 2% ethyl alcohol for 4 hours and subsequently cleansed in distilled water, before being introduced into the DDT suspensions. Such larvae showed increased susceptibility to DDT.

It is concluded that the solvent (ethyl alcohol, also acetone and isopropyl alcohol) in some way enhances the effect of the DDT. In view of these findings, the usual practice of subjecting control larvae to a solution equal in solvent content to that of the test suspension cannot be considered a critical test of the solvent's action.

W. Z. Coker

OWENS, P. N. Función de la ingeniería sanitaria en los programas de erradicación de la malaria. [**The Role of Sanitary Engineering in Malaria Eradication Programmes**] *Bol. Oficina Sanitaria Panamericana*. 1956, July, v. 41, No. 1, 36-44. [14 refs.]

The author reverts to the decision taken by the XIV Panamerican Sanitary Conference of 1954 in Santiago, Chile, to embark on a programme of malaria eradication from the Western Hemisphere [this *Bulletin*, 1956, v. 53, 282, 283, 542]. The implications of that grandiose programme are discussed at some length. The results already achieved by residual spraying in certain parts of the area are recorded. The populations still exposed to malaria infection in the Western Hemisphere aggregate 75,752,500.

As an illustration of the magnitude of the undertaking a brief description is given of the programme planned for Mexico. In Mexico malaria-infected areas cover very little short of a million and a half square kilometres. The population exposed to infection totals 16,746,136. The number of house sprayings projected during 1958 is 4,135,712. This will necessitate the whole-time employment of 1,654 "sprayers" with, of course, the necessary complement of expert supervisors. Sanitary engineers will be in charge of the work in each of the 14 zones into which the country is divided for administrative convenience. Throughout the paper chief consideration is given to the importance of the role destined to be played by sanitary engineers in these large-scale spraying operations.

Norman White

DR CARVALHO, A. G. Realizações do Setor Goiás do Serviço Nacional de Malária durante o ano de 1955. [**Achievements of the Goiaz Section of the National Service of Malaria during the Year 1955**] *Rev. Goiana de Med.* 1956, Jan.-Feb.-Mar., v. 2, No. 1, 29-46, 5 graphs. English summary.

WERNER, H. Über den Einfluss der *Plasmodium berghei*-Infektion auf Placentation und Embryonalentwicklung bei Swiss-Mäusen und Goldhamstern und deren Neugeborenen. [**The Effect of Infection with *Plasmodium berghei* upon Placentation and Embryonic Development in Mice and Hamsters and on their Offspring**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1956, June, v. 7, No. 2, 177-97, 11 figs. [18 refs.]

The author has previously shown that, although *Plasmodium berghei* is incapable of direct penetration through intact placenta, infection of pregnant mothers may damage the foetus in various ways [see this *Bulletin*, 1956, v. 53, 1221]. In the present paper he describes changes in the uteri and foetuses of female mice and hamsters, which were infected before pairing or at various periods of gestation, by intra-peritoneal or subcutaneous inoculation of 8 to 10 million parasites. In one group the mothers were killed at different intervals, while in another group they were allowed to complete the term. The embryos and newborn animals were then examined macroscopically and microscopically.

The results were as follows. The uteri of 11 mice contained 67 embryos, of which 33 were normally developed, while 34 were abnormal, comprising 14 undeveloped, 14 malformed and 6 dead and macerated. Among 81 embryos from 10 hamster uteri, only 10 showed these abnormalities. The pathological changes observed in abnormal embryos are described in detail and illustrated by a series of photomicrographs.

The placentas of underdeveloped and malformed embryos revealed no abnormalities. However, in the case of the dead degenerated embryos the chorionic vessels contained no blood cells but were filled with plasma-like fluid. Furthermore, the blood spaces on the maternal side were abnormally enlarged. The harmful effect upon the embryonic development depends upon the duration, degree and timing of the malarial infection in the mother. The pathological changes in the embryo, which usually take place during the early period of its development, are correlated with the existence of heavy parasitaemia in the mother, lasting at least 4 days.

As regards the offspring of infected mothers, their health is already impaired *in utero*, while after birth they are further weakened by insufficient nutrition in the mother's milk. However, their condition can be improved and their life saved if they are suckled by a hamster foster-mother.

C. A. Hoare

CARRESCIA, P. M. & ARCOLEO, G. Reperti ematologici nelle infezioni da *Plasmodium berghei*. [**Haematological Findings in Infections with *Plasmodium berghei***] *Riv. di Malariologia*. 1956. June, v. 35, Nos. 1/3, 85-100. [19 refs.] English summary.

The investigation described in this paper was undertaken to determine the factors affecting the variable course of infection with *Plasmodium berghei* in mice. For this purpose, observations were made on mice of different age-groups and weights, comprising 32 adults weighing 25-30 gm. and 14 young animals weighing 15-20 gm. These animals were infected subcutaneously or intraperitoneally with inocula containing from 5,000 to 120,000,000 parasites. The results were assessed every other day, by erythrocyte counts per cmm. of blood, by estimating the numbers of normal and parasitized mature red cells, and by histological examination of spleen preparations of mice which died spontaneously.

The results are given in 16 tables, which show that there was no significant difference between adult and young mice, both as regards their reactions to the infection and the blood picture. Nor was the course of the infection affected by the weight of the animals. However, the success of infection differed according to the route of inoculation; thus when introduced intraperitoneally the parasites infected 100% of mice, whereas 34.7% were refractory to subcutaneous inoculation. The incubation (pre-patent) period was influenced both by the route and number of parasites inoculated: its length was 1-2 days after intraperitoneal inoculation of large doses, but with small doses inoculated both by this and the subcutaneous routes the incubation period was 2-8 days. However, the average duration of the patent period was 13.6 days, irrespective of the route of inoculation.

The infected mice died with symptoms of severe anaemia (950,000-1,300,000 RBC per cmm. with 40% macrocytes and 45% reticulocytes). The number of reticulocytes decreased during the first days of infection but with the development of anaemia their number increased progressively. At the time of death the level of parasitaemia was directly correlated with the proportion of reticulocytes present. The pathological changes in the spleen differed according to the severity and duration of the infection, being of the follicular type in acute cases and diffuse in chronic ones. The factors governing the duration of the infection could not be determined, and it is thought that it is due to variations in the response of individual hosts.

C. A. Hoare

RAMAKRISHNAN, S. P., SATYA PRAKASH & SEN GUPTA, G. P. **Studies on *Plasmodium berghei* Vincke and Lips, 1948. XXIII. Isolation of and Observations on a "Milk-Resistant" Strain.** *Indian J. Malariology*. 1956, Sept., v. 10, No. 3, 175-82.

The inhibition of growth of *P. berghei* in mice and rats by feeding on a milk diet was first reported by MAEGRAITH *et al.* [this *Bulletin*, 1953,

v. 50, 384]. It has been stated that such inhibition of growth of *P. berghei* in mice by a milk diet was not apparent in a strain rendered resistant to sulphadiazine [*ibid.*, 1955, v. 52, 1171]. On the assumption that in a population of *P. berghei* some individuals require PAB for growth and some do not, the authors have set out to isolate a "milk-resistant" strain by maintaining infected mice and rats on a milk diet in which PAB was considered to be present in negligible amounts.

The methods used to isolate a strain of *P. berghei* not requiring PAB and the method of estimating parasitaemia in infected rats and mice were essentially those previously described [*ibid.*, 1955, v. 52, 15]. From the results given in tables it appears that isolation of a strain not requiring PAB was easily accomplished from rats and mice. Such a strain was resistant to sulphadiazine in the absence of any previous contact with this drugs.

[The authors accept the explanation of the above results as being due to the fact that some *P. berghei* parasites of a population do not require PAB. No indication is given, however, that any tests were made for the presence or absence of this substance in the milk samples used or how the strain behaved in response to sulphadiazine before isolation of the "milk-resistant" variety.]

J. D. Fulton

DESCHIENS, R., PICK, F. & SARAUE, Ursula. L'immunisation expérimentale de la poule domestique contre l'infestation à *Plasmodium gallinaceum*. [**Experimental Immunization of Fowl against Infection with *Plasmodium gallinaceum***] *Bull. Soc. Path. Exot.* 1956, Mar.-Apr., v. 49, No. 2, 353-65, 8 figs.

The authors carried out an investigation on immunization of fowls against infection with *Plasmodium gallinaceum*. For this purpose they used, as antigen, a saline suspension of formalin-killed parasites reinforced by adjuvants, following the method of THOMSON *et al.* [this *Bulletin*, 1946, v. 43, 311; 1948, v. 45, 49] but using living BCG instead of killed tubercle bacilli. In preliminary tests it was shown that injection of the adjuvants (paraffin oil, BCG) had no harmful effect on the fowls. In the immunization experiments the killed parasites were injected intraperitoneally alone and with adjuvants in various combinations, and after a suitable interval of time the fowls received a challenging inoculation.

The results were as follows: (1) killed parasites alone failed to protect against reinfection; (2) killed parasites in paraffin oil produced only partial protection, for, when challenged, one of the two birds used developed a transient infection; (3) killed parasites with BCG and paraffin oil produced a feeble response when injected simultaneously, but when inoculation of this mixture was preceded by separate injections of BCG and killed parasites, a relatively high immunity was produced: when challenged the fowls developed a low degree of parasitaemia (5%) of short duration (4-6 days).

Since this relative immunity persisted for 2-3 months after the disappearance of the parasites, it is not comparable to premunition, which depends upon the presence of a latent infection in the host. *C. A. Hoare*

RAMA RAO, R. & SIRSI, M. **Avian Malaria and B Complex Vitamins.**

II. Riboflavin. *J. Indian Inst. Sci.* 1956, July, v. 38, No. 3, 186-9 (Sect. A), 1 fig.

In an earlier paper [this *Bulletin*, 1957, v. 54, 132] the authors demonstrated the importance of thiamine in the metabolism of *Plasmodium gallinaceum*. Using the same techniques they now examine the role of riboflavin in infections of 5 chicks. The riboflavin levels in the blood were estimated by a microbiological method (with cultures of *Lactobacillus casei*), before and during infection. The riboflavin content of the blood increased during the incubation period, but with the onset of parasitaemia the level fell and eventually sank to an amount less than normal. When riboflavin was injected intramuscularly during the course of the disease, the multiplication of parasites was facilitated, there was a higher parasitaemia and death sometimes took place earlier. It is suggested that substances which are antagonistic to this vitamin should act as good antimalarial drugs. *P. C. C. Garnham*

RAY, A. P. & SHARMA, G. K. **Acquired Resistance to Chloroquine Diphosphate in *P. gallinaceum* in Chicks.** [Correspondence.] *Nature*. 1956, Dec. 8, v. 178, 1291-2. [12 refs.]

The authors, from the Malaria Institute of India, have prepared a strain of *P. gallinaceum* showing 2- to 3-fold resistance to chloroquine compared with that of the parent untreated strain. The resistance was judged by the values for minimum effective dose [MED] in these two strains. The methods employed were essentially those described previously [this *Bulletin*, 1953, v. 50, 683]. To obtain success by this method low dosage of drug at the start with very gradual increase was found to be necessary. The initial dose of 0.05 mgm. per 50 gm. chick was therefore given during several passages before an increase in amount was attempted. At the end of a 9-month period of experiment 0.123 mgm. per same weight of host was tolerated, after 57 treated passages. [It appears to the abstracter that the dosage of drug per 50 gm. chick host, when given as in this paper to the third and even fourth decimal place in mgm., has no significance.] *J. D. Fulton*

TRYPANOSOMIASIS

In this section abstracts are arranged as far as possible in the following order:—African—human, animal; American—Chagas's disease and other trypanosome infections. In each form the following order is followed:—epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control.

FAIRBAIRN, H. **The Infectivity to Man of Syringe-Passaged Strains of *Trypanosoma rhodesiense* and *T. gambiense*.** *Ann. Trop. Med. & Parasit.* 1956, June, v. 50, No. 2, 167–71.

It has been shown [this *Bulletin*, 1956, v. 53, 550] that a strain of *Trypanosoma rhodesiense*, passaged cyclically by *Glossina morsitans* through sheep, remained infective to man for 18½ years. Another line of this strain was maintained in London for the same period of time by syringe passages through rodents (mainly mice). In order to test the infectivity to man of this substrain, the author was inoculated subcutaneously in the arm with 25 million trypanosomes from a rat infected from the 2,306th mouse passage. Next day a nodule developed at the site of inoculation and persisted for 3 weeks. When punctured, the nodule revealed no trypanosomes.

Four weeks after the author was inoculated, a thick blood film was made and 6 rats were inoculated: both the film and the rats showed no trypanosomes. The author then underwent a course of treatment with Antrypol.

The trypanosomes from the rat, which served to inoculate the author, were examined and measured. They proved to be “monomorphic”, in the sense that stumpy forms were absent. The mean lengths of the intermediate and slender forms in the syringe-passaged substrain were markedly shorter than the corresponding forms in the cyclically passaged strain.

Measurements were also made of a Nigerian strain of *T. gambiense*, which had been maintained in London by syringe passages in laboratory animals and accidentally infected a man after 108 passages over a period of 4 years. As in the case of the above substrain of *T. rhodesiense*, the trypanosomes were monomorphic, but their mean lengths were comparable to those of a fly-transmitted strain.

In discussing his experiments and observations, the author concludes that stumpy forms are not essential for infection, which depends upon the presence in the inoculum of slender or intermediate forms or both, the lengths of which are equal to or greater than those of corresponding forms in a cyclically transmitted strain.

C. A. Hoare

WEITZ, B. & GLASGOW, J. P. **The Natural Hosts of some Species of *Glossina* in East Africa.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1956, Nov., v. 50, No. 6, 593–612, 1 fig. [19 refs.]

By means of a combination of the precipitin test and an inhibition test, shortly to be described elsewhere [see also this *Bulletin*, 1956, v. 53,

416], the nature of the blood meal was determined in a United Kingdom laboratory in smears of nearly 1,500 tsetse flies caught in 17 different areas in East Africa. Most of the data are about *Glossina morsitans* (852 specimens) with some 200 feeds available for *G. swynnertoni* and *G. austeni* but only 75 or less feeds for *G. pallidipes*, *G. palpalis*, *G. brevipalpis* and *G. longipennis*. The available hosts are listed for each area and their relative abundance, although not measured by precise quantitative methods, has been taken into account in the interpretation of the results. Birds and reptiles are recorded by observations on red cell form and it is only for mammals that the specific tests are made.

In a trial of the technique wild tsetse were caught, marked and fed on different known hosts. They were then released in the field, recaptured and their gut contents analysed. The results were very satisfactory indicating a likely error of at most 5% with unknowns.

The tests on wild-caught flies show that the Suidae (pigs) provide about half the food supply of *G. morsitans* and *G. swynnertoni* and about 88% of the meals of *G. austeni*, warthog being the important animal. *G. pallidipes* and *G. brevipalpis* obtained about a quarter or less of their meals from bushpig, in the absence of warthog from the areas of these and the other species of tsetse fly. At least a dozen species of ruminant share the role of hosts to the remainder of the *G. morsitans* and *G. swynnertoni* and, in Zanzibar, are the sole wild animal food of *G. austeni*; buffalo, although an attractive host was not predominantly so; nor was giraffe. The bovid hosts preferred by *G. morsitans* and *G. swynnertoni* appeared to be bushbuck, roan antelope, kudu and reedbuck. Some feeds were taken also on eland, duiker and waterbuck; but, although impala were commonly numerous, very few meals (1 in 163) were taken from them. A further interesting result of this unexpected nature was complete absence of meals from hartebeest and topi. There were positives for ox, sheep and goat where these animals occurred. As regards bovids in relation to other tsetse species, bushbuck was particularly important for *G. pallidipes* (providing 63% of meals) and to some extent for *G. palpalis* and *G. brevipalpis*. Monkey and baboon blood was found rather infrequently and only in *G. morsitans* and once, for baboon, in *G. swynnertoni*. Positives for man in these observations are almost certainly from feeds on the catchers. Zebra, the only equines available in the various areas, were never fed upon at all.

As regards other animals, rhinoceros, though rarely present, were always fed upon by *G. morsitans*, as also were elephant, but to a much smaller extent. The few blood examinations of *G. longipennis* were positive for rhinoceros. Hippopotamus in one area were determined for *G. brevipalpis*, but it is pointed out that the scarcity of other animals in this area was due to shooting. Hippopotamus supplied blood meals for some *G. morsitans* but not for *G. pallidipes* or *G. palpalis*. A variety of animals under the headings of dog, cat and porcupine provided some meals for *G. morsitans*. The commonest hosts for *G. palpalis* were, in fact,

reptiles, and this species of tsetse and small numbers of *G. morsitans* and *G. swynnertoni* had taken up bird blood.

The findings are discussed in terms of indices of "frequency" of selection and "intensity" of biting, the former being the proportion of the number of areas in which a given kind of animal was fed on to the number of areas in which it occurred, and the latter the proportion of feeds on any given animal to all feeds taken. By both indices the warthog remains the preferred host of *G. morsitans* and *G. swynnertoni*, which fed on it wherever it occurred (100% "frequency") and in substantial numbers relative to other available hosts (46% "intensity"). It should be noted that the authors recognize the possibility that some sampling error may be introducing a bias of this magnitude for warthog as host to *G. morsitans*, although there is no evidence of an error of this kind. Rhinoceros, man and other domestic animals were, even if few, always found by and fed on by these tsetse.

Further work is in progress on the effect of seasonal vegetational changes on host selection by tsetse fly. It is not clear why topi and hartebeest are not used for food, this finding being at some variance with earlier field observations by others. [For recent studies on host preferences of tsetse flies in Ruanda, Tanganyika and Southern Rhodesia, respectively, see this *Bulletin*, 1957, v. 54, 139; 1956, v. 53, 416, 865.]

D. S. Bertram

BELLELLI, L. & PIRLO, F. Accorgimenti tecnici per la colorazione di Castellanelle (Trypanosomi) negli strisci di sangue periferico di animali infestati sperimentalmente. [**Technique for Staining Trypanosomes in Blood Films from Experimentally Infected Animals**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1956, Aug., v. 37, No. 8, 434-7, 2 figs. English summary (4 lines).

The authors describe the following new method of preparation of blood films for staining trypanosomes. A small drop of blood is placed on a slide side by side with a similar drop of 14% magnesium sulphate. With the edge of another slide the two drops are mixed together, and a film is spread in the usual way. After the blood film is dried in the air, it is stained by Pappenheim's method (May-Grünwald-Giemsa), with an isotonic phosphate buffer solution at pH 7.0-7.2 for dilution and washing.

Trypanosomes stained by this method are shown in two photomicrographs.

C. A. Hoare

JANSSEN, P. & VAN BOGAERT, L. **The Cerebello-Extrapyramidal Form of Trypanosomiasis. Report of a Case simulating an Abiotrophy with Post-Mortem Study.** *Amer. J. Trop. Med. & Hyg.* 1956, July, v. 5, No. 4, 664-76, 6 figs. [12 refs.]

This paper consists of a detailed account of the symptoms, physical findings and autopsy findings in a case of cerebellar atrophy attributed

by the authors to trypanosomiasis. The patient was 14 years old, and sexually retarded, he had choreo-athetotic movements of the hands and fingers and was mentally deficient. A lumbar puncture revealed clear fluid with 29 lymphocytes and 50 mgm. per cent. of albumin. Neither trypanosomes nor Mott cells were seen on direct smear. He had been treated by two different physicians in the past for trypanosomiasis, but no further details about the illness or the treatment were available.

At autopsy cortical lesions were found to be few; there were disseminated lesions in the cerebellar cortex with loss of Purkinje cells and in the spinal cord there was moderate cell loss in the anterior horns of the cervical region with gliosis of the pyramidal tracts and of the fasciculus gracilis.

[The weakness of this paper is that the diagnosis of trypanosomiasis was not proved and a hereditary cerebellar atrophy of Friedreich's type cannot be excluded. Even if trypanosomiasis had been present a causal relationship between it and the cerebellar atrophy remains unestablished.]

A. W. Woodruff

COLLOMB, H., MILETTO, G. & LEVRON, M. Troubles de la glycorégulation et diamidines. (A propos de trois observations de diabète après traitement par la Lomidine.) [**Disturbance of the Regulation of Carbohydrate Metabolism after Injection of Diamidines. Three Cases of Diabetes after Treatment with Pentamidine**] *Méd. Trop.* Marseilles. 1956, Nov.-Dec., v. 16, No. 6, 786-94.

The diamidines are derived from diguanidines, which cause hypoglycaemia. Slight transient changes in the regulation of carbohydrate metabolism immediately follow the injection of the usual therapeutic doses of these drugs. Substantial and permanent change so far has not been recorded in spite of their extensive use.

In the course of the treatment of some 40 patients for trypanosomiasis with Lomidine [pentamidine dimethanesulphonate] 3 of them developed not hypoglycaemia but diabetes. Two were schizophrenics in a mental hospital under treatment with inoculated *Trypanosoma gambiense*, and the third was a natural case of trypanosomiasis in its latest stage. Full details of each are given in the text. Diabetes appeared in one case 50 days after the Lomidine treatment, and it persisted for 2 months; in another it began 4 to 6 months after it, and lasted for 5 to 6 months; and in the third it began 60 days afterwards and persisted in marked form for 22 months and then in lesser form. In the first 2 cases the hyperglycaemia and other evidence of diabetes eventually vanished entirely. In all three the effect on the general condition, in spite of a considerable hyperglycaemia, was slight. After a review of the literature on the action and on the toxic effects of the diamidines, the authors suggest that the development of diabetes in those treated with Lomidine may be due to a personal predisposition to this condition together with the slow liberation of the diabetogenous Lomidine degradation products.

A. R. D. Adams

PINTO, A. R. da C. Relatório sobre a actividade da Missão de estudo e combate da doença do sono na Guiné Portuguesa referente ao ano de 1955. [**Activities of the Mission for the Study and Control of Sleeping Sickness in Portuguese Guinea during the Year 1955**] *Anais Inst. Med. Trop.* Lisbon. 1956, Mar.-June, v. 13, Nos. 1/2, 275-331, 3 maps, 10 charts & 9 figs. on 6 pls.

During the year 1955, 469,727 Africans, practically the whole of the population exposed to sleeping sickness infection, were examined; 1,328 of these were found infected and 26,093 injections were given. There are indications that the number contracting the infection annually has begun to decline.

The activities of the Mission are not confined to the control of sleeping sickness. Other pathological conditions treated in the different parts of the colony are set out in tabular form. In the capital, Bissau, DDT spraying of houses was initiated as a malaria control measure. Here *P. falciparum* is responsible for 93.6% of infections and *P. malariae* for 5.9%. Of mosquitoes captured in houses *A. gambiae* formed 68% and *A. funestus* 1.28%.

Ankylostomiasis is widespread in the colony: 1,442 cases were treated during the year. 1,313 cases of yaws were treated, double the number treated in either of the two previous years.

Very full information is given regarding the organization and resources in men and material available to the Mission and the report gives evidence of valuable work accomplished.

Norman White

DE ANDRADE E SILVA, M. A. A tsé-tsé em Moçambique. A nossa acção contra a mosca e doenças que ela transmite. [**Control of Tsetse Flies and Trypanosomiasis in Mozambique**] 63 pp., numerous illustrations. Lourenço Marques: Missão de Combate às Tripanossomiasas, P.O. Box 1176.

BOUISSET, L., HARANT, H. & RUFFIÉ, J. Parasitose expérimentale à *Trypanosoma equiperdum* Doflein. [**Experimental Infections with Trypanosoma equiperdum**] *Ann. Parasit. Humaine et Comparée*. 1956, July-Sept., v. 31, No. 4, 331-49, 9 figs. [17 refs.]

The authors briefly discuss the various theories of the cause of death in rats infected with *Trypanosoma equiperdum* or other species: toxæmia, acidosis, excess of potassium, blockage and hypoglycaemia. They think the last is the most probable and this was confirmed by the following experiments.

The evolution of *T. equiperdum* was studied in 184 white rats (males of Commentry strain weighing about 300 gm.). After intraperitoneal infection, there is a latent period of 24-36 hours, then trypanosomes appear in the blood, multiply rapidly and kill the animal in 4 days. There is no agglutination of the organisms, and little cellular response is visible.

Within one hour of death of the host the trypanosomes (unlike malaria parasites) themselves degenerate and die and may be seen in agglutinated masses. The blood sugar level begins to fall before the onset of parasitaemia and later sinks to a very low figure; if glucose is injected into the peritoneum life is slightly prolonged and a much higher parasitaemia occurs. The basal metabolism (oxygen consumption) of rats before infection and near death from the disease was little altered. Rats infected with *Plasmodium berghei* (to the extent of a 25% infection of the erythrocytes) died in 4 days after inoculation with *T. equiperdum*. A milk diet likewise had no effect on the evolution of the trypanosome infection. Artificial hibernation (following injections of chlorpromazine, Dolosal and promethazine, in an environment kept between 10° and 15°C., ensuring rectal temperatures between 30° and 32°C.) caused a lowering of parasitaemia if the animals were hibernated not long after infection.

P. C. C. Garnham

CANTRELL, W. & BETTS, G. D. **Effect of Cortisone on Immunization against *Trypanosoma equiperdum* in the Rat.** *J. Infect. Dis.* 1956, Nov.-Dec., v. 99, No. 3, 282-96, 1 fig. [26 refs.]

[See this *Bulletin*, 1955, v. 52, (1062); 1956, v. 53, 729.]

MOLINARI, V. & MONTEZIN, G. Variations de la virulence de *Trypanosoma congolense* chez la souris après action d'un froid de -180°C. [**Variations in the Virulence of *Trypanosoma congolense* for Mice after Storage at -180°C.**] *Bull. Soc. Path. Exot.* 1956, July-Aug., v. 49, No. 4, 651-4.

The following translation is based on the authors' conclusions:—

(1) The virulence of *T. congolense* for mice is maintained after storage for 3 hours at -180°C. and is not attenuated (of 4 mice tested, all were killed).

(2) *T. cruzi* is not resistant to a temperature of -180°C.—both mobility and virulence disappeared after 5 minutes' exposure.

[See this *Bulletin*, 1956, v. 53, 1235.]

John Rathborn

INES SILVA, Isabel. Acerca de la acción tripanolítica de las sangres sobre los cultivos de *Trypanosoma* (S.) *cruzi* y observaciones sobre el desarrollo del mismo en un nuevo medio de cultivo. [**Trypanolytic Action of Blood on Cultures of *Trypanosoma cruzi* and Observations on its Development in a New Culture Medium**] *Universidad Nacional de Tucuman: Instituto de Medicina Regional. Publicación No. 706.* 1955. Monografía No. 3. 69 pp., 5 text figs. & 116 coloured figs. on 23 pls. [58 refs.] English summary.

As it has been demonstrated that the blood of normal animals has a lytic action on trypanosomes in culture, the author undertook a study of

its effect upon the development of *Trypanosoma cruzi* grown in various media. In the first chapter a detailed description is given of 23 culture media used for the cultivation of this trypanosome. The second chapter is devoted to observations on the trypanolytic action of blood. When a drop of culture is mixed with a drop of normal human serum, the flagellates are immobilized and become rounded, while the outline of the body becomes indistinct. To compare the lytic effect of serum on different stages of *T. cruzi*, tests were made with blood trypanosomes, metacyclic trypanosomes in droppings of bugs, and cultural forms: only the last (crithidia) were immobilized and lysed, whereas the other stages remained active. When cultures were mixed with sera from different persons, all proved to be trypanolytic, but in various degrees (30–90%). The lytic action of serum decreased with dilution, and also diminished progressively with the duration of heating (15 minutes to 4 hours) at 56°–60°C. A comparison was made of sera from different animals: these showed a variable degree of trypanolytic action. Moreover, it was found that the effect of serum from the same animal varied on different days.

It was thought that blood incorporated in blood-agar media might have a deleterious effect on *T. cruzi* in cultures, but comparative tests, made with fresh and inactivated blood, revealed no difference in the growth of the flagellates, the lytic action of the blood being neutralized by the agar.

In the third chapter a description is given of a medium used for the preparation of *T. cruzi* antigens. The solid phase is made up of 5 gm. beef extract, 5 gm. sodium chloride, 20 gm. glucose, 10 gm. peptone, 30 gm. agar, and 1 litre water. The fluid phase consists of sterile plasma. The medium is sterilized at 56°–60°C. for 3–7 hours. The fourth chapter is devoted to methods for overcoming contamination of cultures, which can be sterilized with antibiotics, by washing the flagellates (attached to a slide) with sterile saline, or by isolating colonies growing on the solid part of the medium, after which they can be subinoculated in fresh medium.

In the next chapter an account is given of the course of development of *T. cruzi* growing in the serum of a medium consisting of coagulated bovine blood heated for 2 hours at 56°–60°C. A detailed description is given of the flagellates seen in smears of the culture stained by Giemsa's method. Their appearance is illustrated in 23 plates.

C. A. Hoare

ZAMORANI, V. Observaciones experimentales sobre el *Tripanosoma cruzi* y el *Tripanosoma rangeli*. [**Experimental Observations on *Trypanosoma cruzi* and *T. rangeli***] *Jornadas Nacionales de Puericult. y Pediatr.* Valencia. 1955, Mar. 2–6, v. 2, 713–25, 11 figs. on 2 pls.

This is a comparative study of the behaviour of *Trypanosoma cruzi* and *T. rangeli* in culture, with observations on their effect upon experimentally infected rats, carried out in Venezuela.

The medium used was Difco brain heart-infusion, 10 cc. amounts of

which were distributed in test-tubes, to which 0.5 cc. or 1 cc. of the patients' citrated blood to be tested was added. The cultures were kept in the dark at 26°–28°C. For subcultures agar-brain-heart infusion with 10% rabbit blood, or rabbit broth media were used.

Diagnosis of trypanosomiasis by blood culture was made in the case of 57 children, none of whom showed recognizable symptoms of the disease but were selected owing to contact with Triatomid bugs in their homes. Positive results were obtained in 26 cases (45.6%), which comprised pure *T. cruzi* and *T. rangeli*, as well as mixed infections.

In primary cultures *T. rangeli* multiplied rapidly: abundant growth was obtained in 7–8 days, while metacyclic trypanosomes appeared in 15 days. Growth of *T. cruzi* was much slower, for sometimes the appearance of flagellates could be detected only after 30 days. However, in subcultures growth of *T. rangeli* was slower than that of *T. cruzi*. The blood of some patients inhibited the growth of the trypanosomes, and it was shown that this effect was due to differences in the plasma.

In order to determine the relative pathogenicity of the two trypanosomes, 85 rats were inoculated intraperitoneally: 46 with *T. cruzi* and 39 with *T. rangeli*. The results were assessed by examination of the heart and other muscles. Among rats infected with *T. cruzi* 43 had cardiac lesions with symptoms of diffuse myocarditis, while leishmanial forms of the parasite were present in the muscle fibres. Similar lesions, but in a milder degree and more circumscribed, were seen in 19 rats infected with *T. rangeli*, but leishmanial forms in the heart muscle occurred in only 2 cases.

C. A. Hoare

DE CARVALHO, A. G. & VERANO, O. T. Contribuição ao conhecimento da distribuição geográfica dos triatomídeos domiciliários e de seus índices de infecção natural pelo *Schizotrypanum cruzi* na região amazônica do Estado de Goiás, Brasil. [**Geographic Distribution of Triatomid Bugs and their Natural Infection Index by *Schizotrypanum cruzi* in the Amazon Region of the State of Goiaz, Brazil**] *Rev. Goiana de Med.* 1956, Jan.–Feb.–Mar., v. 2, No. 1, 47–59, 4 figs.

The English summary appended to the paper is as follow :—

“The authors present the first results of entomological surveys on the Chagas' disease, made in 15 counties of the Amazonic Region of the State of Goiaz with the purpose to establish a program of campaign to use insecticides of residual action.

“Because the commerce between the counties of the States of Goiaz, Pará and Maranhão is very intense, these states will become infested since the type of construction of houses and the climate are favourable to the activity of the species of the region.

“The principal vector in the region is *Panstrongylus megistus* [which shows a natural index of infection of 5.90% of 661 examined (39 positive)]. The *Triatoma sordida* has an index of 0.31%. There were examined 644 specimens with two positives only.

[We have found infestation by triatomids in the Amazonian Region of Goiaz covering 39·30% of the area in sq. km., and 42·72% of the total population (1950 census).]

“The authors draw special attention of the National Service of Malaria and Superintendence of Economic Valorization of Amazonia to the results of their observation chiefly about the scattering of triatomid bugs in all the Amazonic region. They point out that the area infested is small, which affords with few resources a barrier to endemia.”

LEISHMANIASIS

In this section abstracts are arranged as far as possible in the following order:—visceral, cutaneous, muco-cutaneous.

DUBOIS, A. & LIMBOS, P. Cas de Leishmaniose viscérale (Kala-Azar) observé en Belgique. [**A Case of Kala Azar observed in Belgium**] Reprinted from *Bull. Acad. Roy. Med. Belgique*. 1955, v. 20, No. 8, 343–52.

The authors report a case of kala azar diagnosed in Belgium although the infection was probably acquired in Southern Italy. They refer to records of 4 other cases similarly diagnosed in Belgium, but in all cases the patient, during the long and indefinite incubation period, had been resident in countries where the disease is known to be endemic. When this illness, with its insidious onset, occurs in a country where practitioners are not familiar with the disease, errors in diagnosis are liable to be made and in the first case, reported by HENTZ and NOEL, a severe anaemia and leucopenia were present before treatment was begun and death occurred on the 6th day of treatment. In the case reported by the present authors a remission had been obtained by the use of a trivalent antimony compound (“Fouadine infantile”) and cure followed treatment by pentavalent antimony compounds and Lomidine. The authors review the symptomatology and methods of diagnosis. It is again illustrated how important it is for practitioners in temperate climates to ascertain the movements of patients and to possess a sufficient knowledge of tropical medicine to recognize the need for instituting the necessary investigations and treatment. [See also this *Bulletin*, 1947, v. 44, 297.]

Frederick J. Wright

SARROUY, C. & GILLOT, F. Caractères épidémiologiques de la leishmaniose viscérale infantile dans le bassin méditerranéen. [**Epidemiological Features of Infant Kala Azar in the Mediterranean Basin**] *Algérie Méd.* 1956, June, v. 60, No. 6, 453–63. [51 refs.]

BANERJEE, Gouri, ROY, D. K. & GANGULI, N. C. **The Amino-Acid Composition of certain Leishmania Bodies.** *Ann. Biochem. & Exper. Med.* Calcutta. 1956, Apr.-May-June, v. 16, No. 1, 57-60. [14 refs.]

"1. Four strains of *Leishmania donovani* isolated from patients (post-kala-azar dermal leishmaniasis) were grown on peptone-glucose-blood-agar slants and were analyzed for their amino-acid contents.

"2. Leucines, phenylalanine, methionine, tyrosine, alanine, threonine, lysine, glutamic acid, aspartic acid, cystine, cysteine, valine, proline, tryptophane histamine, methyl histidine and cystic acid were found in the hydrolyzate of these leishmania bodies.

"3. Excepting arginine and histidine, all other essential amino-acids are present in most of the strains; histidine is present in only one strain. Amongst the non-essential amino-acids, only glycine and serine are absent.

"4. The variations in concentration of individual amino-acids are discussed."

GUHA, A., PYNE, C. K. & SEN, B. B. **Cytochemical Studies of Mitochondria in Leptomonad Form of *Leishmania donovani*, the Kala-Azar Parasite.** *J. Histochem. & Cytochem.* Baltimore. 1956, May, v. 4, No. 3, 212-16, 6 figs. [10 refs.]

The authors studied the cytoplasmic inclusions of the cultural (leptomonad) forms of *Leishmania donovani* by phase contrast microscopy and with various reagents. It was found that the flagellates contained up to 15 granules, of which a few, lying in the anterior end near the flagellum, were small, while the others were large. Cytochemical tests of these flagellates with various redox indicators, such as Janus Green B, Nadi reagent, tetrazolium chloride, as well as staining with Altmann's acid-fuchsin toluidine-blue-aurantia and Regaud's haematoxylin, demonstrated that the granules in question were true mitochondria. It is concluded that the mitochondria in *L. donovani* are the sites of the cellular reduction to form formazan. [See also SEN GUPTA *et al.*, this *Bulletin*, 1954, v. 51, 40.]

C. A. Hoare

DEANE, M. P. & DEANE, L. M. Infecção natural do *Phlebotomus longipalpis* por leptomonas, provávelmente de *Leishmania donovani*, em um foco de calazar, no Ceará. [**Natural Infection of *Phlebotomus longipalpis* by *Leishmania donovani* in Ceará**] *Hospital.* Rio de Janeiro. 1954, June, v. 45, No. 6, 697-702. [10 refs.]

This is the first recorded natural infection of *P. longipalpis*, although this species has been previously shown to be an experimental vector of *Leishmania donovani* (*Hospital*, 1938, v. 17, 2) [see also this *Bulletin*,

1939, v. 36, 449]. The parasite was demonstrated by dissection in 2 of 141 captured female *P. longipalpis* (1.4%). In one case, the infection was light and confined to the stomach, the responsible blood meal having been only partially digested; but in the other, where digestion was complete, a heavy infection of stomach and pharynx was present. Experimentally, 2 of 4 female *P. longipalpis* became heavily infected 6 to 11 days after feeding on an infected dog.

An extensive collection of 7,000 haematophagous arthropods, made in the north of the State of Ceará, Brazil, where kala azar is endemic, comprised 88% *Phlebotomus* spp., of which nearly 99% were *P. longipalpis*. In view of the great preponderance of this species, the authors consider it to be the principal vector of visceral leishmaniasis in the area studied, and perhaps more extensively in Brazil. N. R. Phillips

TAUB, Judith. **The Effect of Normal Human Serum on Leishmania.**
Bull. Res. Council of Israel. 1956, July, v. 6E, No. 1, 55-7.

It was shown by ADLER [this *Bulletin*, 1940, v. 37, 768] that the serum of some patients had a lytic action on *Leishmania* flagellates. Observations have now been made to include the serum of persons in 4 age-groups up to 15 years as well as that of healthy adults. The sera of children and adults suffering from various diseases were also tested against the flagellates but did not yield much information. Flagellates from a strain of *L. tropica*, *L. donovani* or *L. infantum* or a combination of these strains were used. The lytic factor was found to be present in the newborn but thereafter was rare till the age of 5½ years. Above the age of 6 years the lytic factor was commonly present. It was heat-labile, and unaffected by bilirubin or bile salts. Precipitation from aqueous solution was effected by 25% saturation with ammonium sulphate. The substance was non-dialysable and was thought to be a globulin.

Although there was no correlation between age, presence of the lytic factor and incidence of infections with *L. donovani* and *L. tropica*, the author was struck by the correspondence between the age-incidence of *L. infantum* infections and the absence of the lytic factor in serum in children between birth and 6 years. J. D. Fulton

FEVERS OF THE TYPHUS GROUP

In this section abstracts are arranged as far as possible in the following order:—general; louse-borne typhus, flea-borne typhus, mite-borne typhus; rickettsialpox; tick-borne typhus; Q fever, other rickettsial diseases.

COLE, M. M. & BURDEN, G. S. **Phosphorus Compounds as Ovicides and Adulticides against Body Lice.** *J. Econom. Entom.* 1956, Dec., v. 49, No. 6, 747–50. [17 refs.]

“Seventy-three phosphorus compounds were tested as ovicides and adulticides against laboratory colonies of body lice (*Pediculus humanus humanus* L.). In acetone solutions parathion was the most effective ovicide, causing complete kill of eggs at a concentration of 0.0025% and sulfotepp was the most effective against adult lice, causing complete kill at 0.0000025%. Malathion and Chlorthion, which hold some promise for practical use in louse powders because of their low mammalian toxicity, were completely effective as adulticides at 0.001% and as ovicides at 0.05 and 1%, respectively. Malathion and Chlorthion in powders were about 97% effective as ovicides at 0.5 and 1%, respectively. The ovicidal action of O,O',O'',O'''-tetraethyl thiopyrophosphate was synergized by the addition of sulfoxide, but that of three other phosphorus compounds was not. Lice and eggs from a colony highly resistant to DDT showed no cross-resistance to 10 phosphorus compounds. The ovicidal effectiveness of malathion was directly correlated with the relative humidity, and that of malathion and Chlorthion with the age of the eggs. Pyrophyllite powders containing 0.1% of malathion or Chlorthion were completely effective against adult lice for 14 days.”

WISSIG, S. L., CARO, L. G., JACKSON, Elizabeth B. & SMADEL, J. E. **Electron Microscopic Observations on Intracellular Rickettsiae.** *Amer. J. Path.* 1956, Nov.–Dec., v. 32, No. 6, 1117–33, 9 figs. on 4 pls. [18 refs.]

Electron micrographs of sections of osmium-fixed chick embryo yolk sac tissue at various stages of infection with *Rickettsia mooseri* showed that rickettsiae were confined to mesothelial and epithelial cells. As the number of rickettsiae increased, there was a reduction in quantity of cytoplasmic organelles, notably the endoplasmic reticulum and fine fibrils. Inflammatory tissue reaction was not observed. Rickettsiae were extremely electron-dense, the core showing slight mottling. Numerous spheroidal granules were visible in the protoplasm when purified suspensions of the organisms were examined after fixation while still in aqueous suspension. Intracellular rickettsiae fixed *in situ* were spherical or rod-shaped, measuring about 250 m μ in width and up to 1.2 μ in length; an external limiting membrane was rarely present, although washed organisms from the same tissue always possessed such a structure. In

contrast, a limiting membrane has been seen consistently in association with *R. tsutsugamushi* in sections of infected tissues and tissue cultures.

R. S. F. Hennessey

SASA, M. & MIURA, A. **Notes on Nymphs and Adults of Tsutsugamushi of Japan, and their Laboratory Rearings (Studies on Tsutsugamushi, Part 83).** *Japanese J. Exper. Med.* 1955, Dec., v. 25, No. 6, 197-209, 1 fig. & 4 pls.

Nymphs of *Trombicula ichikawai* and *Euschöngastia miyagawai* and adults of *T. scutellaris* and *T. daisen*, bred out from larvae for the first time, are described in this paper. A provisional key is given to the nymphs of trombiculid mites of Japan. It was necessary to puncture the eggs of *Culex* to make them acceptable as food for the nymphs of *T. scutellaris*; this species is a suspected vector of scrub typhus in the Izu Islands and some areas in Japan. Notes, with illustrations, are given of some refinements in rearing techniques.

D. S. Bertram

MELNOTTE, P. & MENGUS, B. Premier cas autochtone de fièvre bouton-neuse en Lorraine. [**First Autochthonous Case of Boutonneuse Fever in Lorraine**] *Bull. Soc. Path. Exot.* 1956, July-Aug., v. 49, No. 4, 609-12, 1 chart.

KIREEVA, R. Ya. [**Clinical Features of the Tick-Borne Typhus of Northern Asia**] *Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii.* Moscow. 1956, No. 9, 73-7, 1 chart. [In Russian.]

The author has studied the clinical features of tick-borne typhus in 62 patients living in the Khabarov area of the Soviet Union. The seasonal incidence was very marked, 57 cases occurring in June-August, and the disease differed in this respect from the otherwise identical tick-borne typhus of various parts of Siberia, in which the main incidence is in May. All patients had been in the woods before the onset of illness; 34 were town-dwellers who were on holiday in the country, and the remainder were herdsmen, milkers and road-menders. Tick bites and a primary lesion were found on 42 patients. The incubation period ranged from 1 to 10 days, with an average duration of 3-5 days. The onset was usually acute, with fever, headache and abdominal and limb pains, but in one-quarter of the patients the symptoms developed more slowly after a prodromal period. The febrile period lasted for 5-17 days. All patients showed hyperaemia of the face, extending less frequently to the neck and trunk; in 41 the pharynx was injected, and punctate haemorrhages were present on the soft palate in severe cases. A roseolo-papular exanthem appeared on the trunk and limbs between the 2nd and 5th days of illness

and lasted for 3-5 days. Other features of the disease were myocarditis, nephritis, delirium and meningism. *D. J. Bauer*

MARMION, B. P. & HARVEY, M. S. **The Varying Epidemiology of Q Fever in the South-East Region of Great Britain. I. In an Urban Area.** *J. Hygiene.* 1956, Dec., v. 54, No. 4, 533-46, 1 map & 1 fig. [15 refs.]

This is a description of an investigation into the epidemiology of Q fever in 2 towns which for all practical purposes form a single seaside holiday resort in the north-east of Kent. The total population is about 35,500. The incomes of the inhabitants are derived chiefly from catering for visitors, retirement pensions, house building and fishing. There are no dairy farms and neither cattle nor sheep enter the urban area.

The chief part of the survey consisted of complement-fixation tests with Q fever antigen of sera from 160 volunteers who had suffered from pneumonia or undiagnosed fever during the years 1948 to 1954; 22 of these reacted with *Rickettsia burneti* antigen at titres of 1 in 40 or more. These titres were regarded from previous experience as pointing strongly to a previous attack of Q fever and the reactors are referred to by the authors as "patients". As many as 13 of them reacted at 1 in 160 or over. Among 221 healthy blood donors from the same area who acted as controls only 2 reacted at 1 in 40.

Among the patients 14 gave a history of illness clearly suggesting Q fever and the others may well have had the disease. The dates of the attacks were 1949 and 1950 in 18 of the cases and in each of the following 3 years there were one or two cases. Twelve of the patients were male and 11 were female.

Among 19 patients who were questioned on the subject 14 had lived in the area for less than 11 years and only 5 for a longer time. There was no predilection for any season; one or more cases occurred in every month of the year except November and December. Only one of the patients gave a history of occupational contact with farm animals and none of them had lived within 200 yards of buildings in which live stock were housed or of fields in which cattle or sheep grazed, whereas 18 of the 137 non-reactors lived within 200 yards of such possible sources of infection. The household supply of milk of 91 per cent. of the patients was raw before the onset of the illness whereas it was raw in 67 per cent. of 137 non-reactors; this difference is regarded as statistically significant, pointing to an association of the infection with raw cows' milk. All but one of the patients were supplied with milk from 5 of the 16 retail dairies in the towns, and milk from 2 of these dairies was found to have come from farms in which the bulked milk had been found infected on several occasions.

The main source of infection appeared to have been infected cows' milk. *John W. D. Megaw*

MARMION, B. P. & STOKER, M. G. P. **The Varying Epidemiology of Q Fever in the South-East Region of Great Britain. II. In Two Rural Areas.** *J. Hygiene.* 1956, Dec., v. 54, No. 4, 547-61, 1 fig. [11 refs.]

The authors describe their findings in a study of the epidemiology of Q fever in 2 rural areas of the south-east region of England. One area is the Romney Marsh area of Kent [this *Bulletin*, 1956, v. 53, 171, 172]; it has an average sheep population of 75 ewes or 287 sheep of all kinds and 10 cattle per 100 acres of grass land and crops. The other area consists of fen land in Cambridgeshire; it has hardly any sheep and has 12 cattle per 100 acres.

The investigation was carried out on the same lines as are described in the preceding paper. In the Romney Marsh area 95 persons (60 males and 35 females) who had had pneumonia or an undiagnosed fever during the period 1949-1954 were tested for complement-fixing antibodies against *Rickettsia burneti*. Twelve of the 60 males and 1 of the 35 females reacted at titres of 1 in 40 or more and were assumed to have had recent attacks of Q fever, whereas among 106 healthy adults in the area only 1 reacted at 1 in 40. In the rural area in Cambridgeshire the corresponding figures were: none of 50 persons who had had pneumonia or undiagnosed fever and none of 107 healthy adults gave positive reactions at 1 in 40. Low-titre reactions (1 in 10 and 1 in 20) among healthy adults in the two areas were strikingly different; in the Romney Marsh area they were found in 15 of 106 persons compared with only 2 of 107 persons in the Cambridgeshire area. In the urban area dealt with in the preceding paper low-titre reactions occurred in 19 of 240 persons and it is suggested that the rate of incidence of these reactions may give a rough indication of the relative frequency and importance of Q fever in a given area.

The Romney Marsh area is most unusual in having a dense population of sheep which is specially favourable for the maintenance of infection among the sheep and also among the cattle of the area; the human population is exposed to a combination of risks such as contact with infected sheep, especially at the lambing season, infection by drinking infected cows' milk and probably also the inhalation of infected dust resulting from the drying of discharges from infected cattle or sheep.

All the 13 cases of Q fever in the Romney Marsh area occurred during the lambing and shearing season, March to July.

An effort was made to isolate *R. burneti* from floor sweepings from places frequented by the shepherds in the lambing season and from dust from the shepherds' clothing but only one specimen of dust from a shepherd's clothing gave a positive result.

Infection was demonstrated among both sheep and cattle in the Romney Marsh area but in the Cambridgeshire area the pooled milk from all the 16 herds and the sera of 92 cows were found free from evidence of infection.

Although a sheep tick, *Haemaphysalis punctata*, in the Marsh area had been found infected with *R. burneti* there was no evidence that it played any part in the spread of infection among sheep or cattle or from these animals to man. A search for other animal reservoirs of infection yielded negative results; the organs of 229 wild rabbits, of 30 other small mammals and of 166 wild birds in the Marsh area were examined by inoculation into guineapigs.

John W. D. Megaw

MELNOTTE, P. & PETIT, J. Un cas de fièvre Q autochtone à forme splénomégaly. [**An Autochthonous Case of Q Fever with Splenomegaly in Lorraine**] *Bull. Soc. Path. Exot.* 1956, July-Aug., v. 49, No. 4, 603-9. [17 refs.]

BROWN, R. D. **Q Fever—Veterinary Aspects.** *East African Med. J.* 1956, Nov., v. 33, No. 11, 441-5. [21 refs.]

"Some aspects of Q Fever are discussed. A small survey of the incidence of *R. burneti* antibodies in domestic animals in Kenya gave the following results:

Dogs	3 out of 4	positive
Horses	0 out of 17	"
Camels	4 out of 20	"
Goats: Wajir	51 out of 153	"
Eldama Ravine	45 out of 130	"
Cattle	14 out of 190	" "

SALVERAGLIO, F. J., BACIGALUPI, J. C., SRULEVICH, S. & VIERA, O. Comprobación epidemiológica y clínica de la fiebre Q. en el Uruguay. [**Epidemiological and Clinical Verification of Q Fever in Uruguay**] *An. Facul. de Med. Montevideo.* 1956, May-June-July-Aug., v. 41, Nos. 3/4, 131-8, 1 fig.

The English summary appended to the paper is as follows:—

"The epidemiology of Q Fever, has been investigated in Uruguay, by means of the complement fixation and the capillary agglutination tests. An antigen obtained from Lederle Laboratories was used in the first test, and a Lauri Luoto's antigen in the second one.

"The results were:

"In 99 human sera, from the general population, all the results were negative.

"In 24 human sera, from butchers of the city and employees of a dairy plant, all the results were negative.

"Among 25 sera from employees of a meat packing house, 5 showed a positive agglutination test. Out of these 5 positive sera, 2 also were positive with the complement fixation test.

" Among 138 sera from cattle, 16 were positive in the agglutination test. Out of these 16 positive sera, 8 also were positive in the C.F.T.

" Negative results were recorded with sera from 31 guinea pigs of the Instituto de Higiene de Montevideo.

" On the basis of clinical, epidemiological and laboratory findings, a diagnosis of Q Fever has been made in a patient with atypical pneumonia, hospitalized at the Instituto de Enfermedades Infecciosas de Montevideo.

" The authors consider that there is evidence of the existence of Q Fever in cattle and people in Uruguay. They suggest the possibility of chronic cases, and insist on the importance of a more complete knowledge of the problem."

STOKER, M. G. P., SMITH, K. M. & FISET, P. **Internal Structure of *Rickettsia burnetii* as shown by Electron Microscopy of Thin Sections.** *J. General Microbiol.* 1956, Dec., v. 15, No. 3, 632-5, 5 figs. on 2 pls. [13 refs.]

Suspensions of *Rickettsia burnetii* from infected yolk sacs were purified by ether extraction and differential centrifugation, fixed in osmic acid, sectioned in methacrylate and examined by electron microscopy. All the organisms possessed a limiting membrane 5-10 m μ in thickness. This membrane was separated from a very dense irregular central body by an intermediate zone about 25 m μ in thickness containing granules about 5 m μ in diameter. The central body seemed to consist of an irregularly twisted strand or strands, one section showing a strand doubled back on itself. This body was larger and denser than those seen in the central region of bacteria, while the intermediate granular region was far less dense than in bacteria.

R. S. F. Hennessey

LUOTO, L. **A Capillary-Tube Test for Antibody against *Coxiella burnetii* in Human, Guinea Pig, and Sheep Sera.** *J. Immunology.* 1956, Nov., v. 77, No. 5, 294-8. [13 refs.]

In an evaluation of the capillary tube (CT) agglutination test for *Rickettsia burnetii* antibody [this *Bulletin*, 1954, v. 51, 166], the results of parallel examinations of 535 human, 193 guineapig and 864 sheep sera by the CT and complement-fixation (CF) methods showed that the two tests were of approximately equal sensitivity. About 18% of CF-positive hamster sera were negative by the CT test. As undiluted sera can be tested by the CT method, low levels of antibody were detectable in sera that failed to react when diluted in the CF test. " The simplicity of the [CT] technique permits rapid testing of sera in the absence of elaborate laboratory facilities and trained personnel."

R. S. F. Hennessey

WESPI, H. Ein Fall von Q-Fieber-Hepatitis. [**A Case of Q Fever Hepatitis**] *Schweiz. med. Woch.* 1957, Jan. 26, v. 87, No. 4, 90-93. [11 refs.]

[See this *Bulletin*, 1957, v. 54, 24.]

PULVER, W. & FELLMANN, N. Über tödlich verlaufene Q-Fieber-Erkrankungen. [**Observations on Fatal Cases of Q Fever**] *Schweiz. med. Woch.* 1957, Jan. 26, v. 87, No. 4, 73-7, 2 figs. [Numerous refs.]

YELLOW FEVER

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control.

See also p. 499, LEWIS, **Some Mosquitos of the Sudan.**

ELTON, N. W. **Yellow Fever in Central America: the Imminent Threat to Mexico and the United States.** *Amer. J. Pub. Health.* 1956, Oct., v. 46, No. 10, 1259-65, 1 map. [38 refs.]

Colonel Elton of the U.S. Army is noted for his epidemiological study of yellow fever in the Americas, and in recent years he has kept track of the epizootic among monkeys which has been moving northward from the Panama zone since 1948. In his last progress report [this *Bulletin*, 1955, v. 52, 1075] he mentions an outburst of monkey mortality in the vicinity of La Ceiba in northern Honduras in March 1954 and later in August of the same year 2 non-fatal human cases. He then predicted that the Motagua Valley of northern Guatemala would be invaded during the second half of 1955; this has been confirmed by the finding of the typical lesions in the livers of dead monkeys from this area in February 1956. It is thought that the delay in the northward advance of jungle yellow fever was due to deforestation in its path across the Ulua Valley in north-western Honduras. The behaviour of the advancing wave in crossing valleys appears to depend largely on the pattern of forest continuity. The main axis of the wave has exhibited a tendency to follow the 1,000 feet contour but on several occasions it has invaded coastal forests at or near sea level where mountains lie close to the shore line.

It is probable that the advance through Guatemala and Mexico will continue in the orderly manner that is expected, at an estimated overall velocity of 13 miles per month. It is also expected that transient enzootic foci will be of more frequent occurrence from now on.

The locale of the present (as at September 1956) front of the main axis of the wave is in northern Guatemala with ballooning into British

Honduras. The primary axis will probably move north-west down the valley of the Usumacinta river towards the Gulf state of Tabasco and will swing westwards through Chiapas to the State of Veracruz in Mexico. The rain forest of the States of Chiapas and Tabasco will probably be overtly involved during the period July–October 1957.

The threat of urbanization of the virus to the Gulf settlements of Mexico and the United States is now imminent and the time for preparatory counter-measures is at hand. These would include a careful review and revaluation of all historic material of records of past epidemics, even in remote times; and aerial surveys of the forests of Guatemala, British Honduras and Mexico in the expected path of the advancing wave.

The entire southern part of the United States has already been recognized as a "yellow fever receptive" area, and it would appear that the threat to that country is only a minor calculated risk. Nevertheless the past history of the disease around the coast of the Gulf of Mexico suggests that the vagaries of the climate could induce sudden increases in the *Aedes aegypti* population and even extend its geographical distribution. It must not be overlooked that unexpected contingencies could arise with a virus as notoriously capricious as that of yellow fever.

R. Ford Tredre

PANTHIER, R. Présentation d'appareils utilisés pour la préparation du vaccin antiamaril. (Souche 17D de la Fondation Rockefeller.) [Description of the Methods used for the Preparation of Yellow Fever Vaccine (17D) in the Pasteur Institute] *Bull. Soc. Path. Exot.* 1956, July–Aug., v. 49, No. 4, 616–20, 7 figs. on pl.

DENGUE AND ALLIED FEVERS

SMITH, C. E. G. Isolation of Three Strains of Type 1 Dengue Virus from a Local Outbreak of the Disease in Malaya. *J. Hygiene.* 1956, Dec., v. 54, No. 4, 569–80, 3 figs. [22 refs.]

About 40 persons were involved in an outbreak of dengue-like disease in a Kuala Lumpur girls' school hostel in March 1954 [this *Bulletin*, 1957, v. 54, 25] and a strain of a virus considered to be type 1 dengue virus was recovered from each of 3 patients by inoculating serum (Chia strain) or defibrinated blood (Schleman and Smith strains) intracerebrally and intraperitoneally into suckling mice. The blood specimens giving the Chia and Smith strains were taken on the 1st day of illness, the specimen yielding the Schleman strain being taken on the 2nd day. The Chia strain was adapted to adult mice in the course of serial passage of 10% brain suspensions through suckling mice, full adaptation being achieved at the 33rd passage.

A 30-fold rise in neutralizing antibody to Chia virus occurred during the illness of the patient from whom this strain was isolated, together with large increases in haemagglutination-inhibiting antibodies to Chia, dengue-1 and dengue-2 viruses. Significant neutralization of Chia virus was obtained only with homologous and dengue-1 antisera. The Smith and Schleman strains, which were not adapted to adult mice, were indistinguishable from each other and from the Chia strain in haemagglutination-inhibition tests with serum containing antibody for the Chia strain.

R. S. F. Hennessey

HOTTA, S. & EVANS, C. A. **Ether-Sensitivity of Dengue Virus.** [Correspondence.] *Virology*. New York. 1956, Oct., v. 2, No. 5, 704-6.

The Mochizuki, Hawaiian and New Guinea strains of dengue virus were inactivated by exposure to ethyl ether (20% by volume added to rhesus kidney tissue cultures containing the viruses) for 24 hours. This is compatible with the concept that dengue virus is related to the viruses of yellow fever and the arthropod-borne encephalitides [*Bull. Hyg.*, 1951, v. 26, 438; 1955, v. 30, 81, 185]. Tests for ether sensitivity may be useful in excluding the possibility that an agent isolated in mice is Theiler's mouse encephalomyelitis virus, which is ether-resistant.

R. S. F. Hennessey

SCHLESINGER, R. W., GORDON, I., FRANKEL, J. W., WINTER, J. W., PATTERSON, P. R. & DORRANCE, W. R. **Clinical and Serologic Response of Man to Immunization with Attenuated Dengue and Yellow Fever Viruses.** *J. Immunology*. 1956, Nov., v. 77, No. 5, 352-64, 2 figs. [16 refs.]

Inoculation of adult volunteers with mouse-adapted type II dengue virus (New Guinea B strain) in doses of $10^{4.7}$ to $10^{6.9}$ mouse LD₅₀ produced clinical reactions as mild as those seen after immunization with type I virus, the chief manifestation being a maculo-papular rash. Homologous neutralizing antibody developed in 10 of 11 volunteers. Combined inoculation with type II dengue and yellow fever 17D viruses, or with types I and II dengue and 17D viruses, led to development of antibody mainly against dengue II virus in men who had not previously been inoculated against yellow fever. Rapid and comparable antibody responses to both dengue viruses and to virus 17D occurred in 3 of 4 men who had previously received yellow fever vaccine. It seems likely that mutual interference and suppression of antigenicity can occur with these attenuated viruses. In view of the anamnestic response in men inoculated with type II dengue virus who had previously been vaccinated against yellow fever, it may be possible to find a virus which would provide a broad range of cross-protection when given after yellow fever vaccine.

R. S. F. Hennessey

RABIES

NEDUNGADI, V. S. **Rabies due to Mongoose Bite.** *J. Indian Med. Ass.* 1956, Dec. 1, v. 27, No. 11, 400-401.

A report of 2 cases in Tanjore, India.

BULLING, E. Die Züchtung des Tollwutvirus im Hühnerei. [**The Cultivation of Rabies Virus in the Hen's Egg**] *Zent. f. Bakt.* I. Abt. Orig. 1956, v. 167, No. 1, 1-9, 1 fig. [11 refs.]

The Pitman-Moore strain of fixed rabies virus has been adapted to chick embryos after 45 intracerebral passages in young chicks. The virus was inoculated into the yolk sac of fertile eggs at the 7th day of incubation, and a passage was made from the brains of embryos harvested after incubation for a further 10 days. In titrations carried out in mice the titre of virus in the brain was 5.5 log. units, and virus was also present in the chorio-allantoic membrane, yolk sac, muscles and internal organs, and persisted in the chicks at least up to the 4th day after hatching. The infection has so far been carried through 42 passages. *D. J. Bauer*

BRYGOO, E. R. & DODIN, A. Action de la hyaluronidase sur l'évolution de la rage à virus des rues chez la souris. [**Action of Hyaluronidase on the Development of Rabies caused by Street Virus in Mice**] *Ann. Inst. Pasteur.* 1956, Dec., v. 91, No. 6, 937-8.

The following is a translation of the authors' summary:—

The addition of 1,500 units of hyaluronidase to a suspension of street virus has not modified appreciably the development of experimental rabies in mice. [For the effect of hyaluronidase on fixed virus, see this *Bulletin*, 1949, v. 46, 728, 1141; 1953, v. 50, 1134.] *H. J. O'D. Burke-Gaffney*

PECK, F. B., Jr., POWELL, H. M. & CULBERTSON, C. G. **Duck-Embryo Rabies Vaccine. Study of Fixed Virus Vaccine grown in Embryonated Duck Eggs and killed with Beta-Propiolactone (BPL).** *J. Amer. Med. Ass.* 1956, Dec. 8, v. 162, No. 15, 1373-6. [11 refs.]

That the neuromuscular accidents, which occasionally complicate anti-rabies treatment, result from the sensitization of the vaccinated person to some tissue-specific component of the nervous tissue contained in vaccines prepared from brain substance infected with virus, is widely believed; it seemed reasonable to suppose, therefore, that if fixed rabies virus could be cultivated successfully on non-nervous tissue, elimination of the paralysis-provoking factor from such a virus vaccine might well be achieved. Proof advanced by the authors in previous reports that the

virus could be grown in embryonated duck eggs [this *Bulletin*, 1950, v. 47, 733] and that the vaccine produced by this method was, as determined by tests in guineapigs, free from neuroparalytic factors, established the validity of the hypothesis; moreover the vaccine, when administered to human beings, evoked in the majority an early and satisfactory antibody response [*ibid.*, 1955, v. 52, 970]. The present report concerns laboratory and clinical aspects of this duck-embryo vaccine, in which the virus has been killed by the action of beta-propiolactone (BPL).

Laboratory studies showed that concentrations of BPL between 1 in 1,000 and 1 in 4,000 regularly inactivated the strongest dilutions (10^{-1} and 10^{-2}) of the virus suspensions; that, when tested for potency on white mice, the virus-vaccine inactivated with 1 in 4,000 BPL possessed the greatest immunizing power, being indeed 3.28 times more antigenic than the NIH Rabies reference vaccine; that vaccine so prepared withstood storage at 37°C. for 2 or 4 weeks considerably better than did the NIH reference vaccine when similarly stored; and that *Cynomologus* monkeys were effectively immunized by 14 daily injections of the vaccine, without untoward after-effects, evidence of immunity being based on the presence of neutralizing antibody in 15-, 30- and 60-day serum specimens drawn from the monkeys.

Clinical response to the vaccine was studied in 28 male volunteers, 21 of whom were scheduled to receive 14 daily injections (Group I) and the remainder 7 daily injections (Group II). Because of severe reactions 2 individuals in each group did not complete the prescribed treatment. Blood specimens were obtained from all 28 subjects before the first injection and again on the 10th, 15th and 30th days thereafter; the 5 persons receiving a total of 7 injections also had a 7th-day bleeding. Reactions to vaccination were local and systemic, the former comprising tenderness at the site of injection, erythema and induration of varying degree, the latter occurring in but one individual, who developed chills, fever and malaise after the sixth injection. All 28 sera were examined for neutralizing antibody. In Group I all had developed antibody by the 10th day after the first injection and antibody continued to be present on the 15th and 30th days. Only one of Group II had demonstrable antibody on the 7th day, although 5 of the others had antibody on the 10th day. Detectable antibody appeared, therefore, between 7 and 10 days after the first inoculation of the duck-embryo rabies vaccine.

G. Stuart

LAHA, P. N. **Polyneuritis caused by Antirabic Vaccination.** [Memoranda.] *Brit. Med. J.* 1957, Jan. 19, 148.

In the author's series of 2,455 patients receiving antirabies vaccine in Gwalior, India, between August 1954 and July 1955, neurological complications occurred in 5 (0.2%), of whom 2 developed polyneuritis. The fact that polyneuritis is the rarest form of such complications led the author to provide in this memorandum clinical details of his 2 cases.

Both cases occurred in adult Hindu males, to whom vaccine had been given in a daily dosage of 5 ml.

In case I, three days after receiving the last of his 14 injections, the patient experienced in all limbs a weakness, which, becoming progressive, occasioned his admission to hospital. In case II the patient, after the 7th injection, had slight fever, with pain and weakness in all limbs; as a result, vaccination was discontinued for 4 days and then recommenced, 2 further injections being given; increasing weakness compelled admission to hospital.

Examination showed in both cases lower motor neurone paralysis of all limbs, with marked weakness, loss of all tendon-jerks except the supinators, and tenderness of the calf muscles; there were no other subjective or objective sensory disturbances and no signs of myelitis; other systems were normal, and sphincteric control was retained throughout. Both patients were treated with vitamins B1 (100 mgm.) and B12 (100 μ gm.) parenterally on alternate days. In case I the patient remained in hospital nearly 4 months, his condition deteriorating during the first 2 months, with wasting of the distal muscles of the limbs. Subsequently he improved slowly, but, on his discharge from hospital, the limb weakness, loss of tendon-jerks and the wasting of the distal muscles persisted. In case II the patient gradually recovered after 6 weeks in hospital; a fortnight later he was discharged with a fair degree of power in all limbs, loss of tendon-jerks, ability to write but not to type, and no tenderness in the calf muscles.

In discussing the neuromyolytic accidents of antirabies treatment, the author refers to their incidence in general and to the pathogenesis and pathology of the polyneuritic form in particular. The pathogenesis of this form is controversial; as regards its pathology, "both mesodermal and parenchymatous toxi-degenerative lesions characterize the palsy".

G. Stuart

PLAGUE

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, rodent hosts, transmission, pathology, diagnosis, clinical findings, treatment, control.

BLANC, G. Une opinion non conformiste sur le mode de transmission de la peste. [**A Nonconformist Opinion on the Mode of Transmission of Plague**] *Rev. d'Hyg. et de Méd. Sociale*. Paris. 1956, Sept., v. 4, No. 6, 535-62, 11 figs. [Refs. in footnotes.]

The author presents a formidable array of evidence in favour of the unconventional view that bubonic and septicaemic plague are not transmitted to man solely, perhaps not even chiefly, from infected rats by the rat flea *Xenopsyllus cheopis*, but are transmitted commonly from man to

man by human ectoparasites such as *Pulex irritans* and *Pediculus corporis*. Various workers are quoted in support of this view. Fabian HIRST in his book *The Conquest of Plague* [this *Bulletin*, 1953, v. 50, 1179] states that it is improbable that the human flea has been the chief agent in propagating the major epidemics of the historic period but admits that *Pulex irritans* can reasonably be regarded as having been an important auxiliary in transmitting infection at the time of the Black Death. Many observers have described the occurrence of plague in man in the absence of rats and have concluded that when the bacillus has once been introduced into a human community by *X. cheopis* it can then be maintained as a man-to-man infection by human ectoparasites. Among these authorities are C. J. MARTIN, A. W. BACOT, M. GAUD, W. MACARTHUR and Ricardo JORGE. Numerous other observers are quoted as favouring the view that in certain conditions transmission may be maintained either by the human flea or by rat fleas which have become adapted to parasitic existence on human hosts. Those who hold the above views are listed in a section of the paper under the heading *Les Non Totalement Conformistes*. In a later section headed *Les Non-Conformistes* the author gives a summary of the views expressed by himself and M. BALTAZARD in a series of articles published during the years 1941-45. These views, based on an investigation of an epidemic of plague in Morocco and on laboratory experiments are that although there can be no endemic plague in the absence of rats and their ectoparasites, so also there can be neither epidemics nor endemo-epidemics without man-to-man transmission in which human ectoparasites play the chief part.

The criticisms of these nonconformist doctrines, especially those of G. GIRARD, are fully stated and refuted at considerable length.

A specially interesting part of the paper contains references to, and quotations from, a treatise on plague written in Latin by a distinguished Dutch physician, DIEMERBROECK, in 1665. In this the great epidemic in 1636-37 is attributed to the richly deserved anger of God and the causal *contagium* is regarded as being transmitted from one person to another in the same way as hydrophobia is conveyed by the bite of a rabid dog. A view expressed by a contemporary physician, KIRCHER, is quoted with disapproval by Diemerbroeck; this was that the plague virus consists of a congeries of exceedingly small living animalculae, invisible to the naked eye, which enter the body by inhalation or through the pores [presumably of the skin]. Diemerbroeck is also quoted as explaining how it is possible for so small a quantity of virus contained in fomites to infect large numbers of contacts; he pointed out that a tiny crumb of yeast could cause fermentation of a large mass of dough. *John W. D. Megaw*

SAGAR, P., AGARWALA, S. C. & SHRIVASTAVA, D. L. **Studies in the Enzyme Make Up of *Pasteurella pestis*. Part II. Phosphatase Activity of Virulent and Avirulent Strains.** *Indian J. Med. Res.* 1956, Oct., v. 44, No. 4, 593-600, 3 graphs. [11 refs.]

In view of the correlation of phosphatase activity and virulence noted in *Staphylococcus pyogenes* [Bull. Hyg., 1951, v. 26, 944] and *Salmonella typhi* [ibid., 1955, v. 30, 435], the alkaline phosphatase activity of 9 virulent and 8 avirulent strains of *Pasteurella pestis* was assayed with sodium β -glycerophosphate as substrate. All strains dephosphorylated the substrate but no general relationship between virulence and phosphatase activity was apparent. One avirulent strain showed abnormally high activity, releasing 72.0 μ gm. of inorganic phosphorus in 2 hours as compared with 2.8–7.5 μ gm. released by the other strains. [For Part I, see this Bulletin, 1957, v. 54, 32.]

R. S. F. Hennessey

BRYGOO, E. R. & CÔURDURIER, J. Test sur souris de l'efficacité du vaccin E.V. [Use of Mice for Testing the Efficacy of Plague Vaccine, EV Strain] Ann. Inst. Pasteur. 1956, Dec., v. 91, No. 6, 939–43. [10 refs.]

This paper describes a method used for evaluation of the protective activity of antiplague vaccine (the avirulent EV strain) in white mice. Groups of mice are inoculated intraperitoneally with graduated doses of vaccine, challenged 15 days later by intraperitoneal inoculation of graduated doses of virulent *Pasteurella pestis*, and the 50% protection rate for each dosage group derived from LD50 of test and control groups calculated by the method of Reed and Muench. Information obtained on these lines is useful both for routine assessment of cultures for vaccine production and for comparing different immunization techniques.

R. S. F. Hennessey

CHOLERA

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

BANERJEE, Gouri, ROY, D. K. & GANGULI, N. C. The Amino-Acid Composition of *Vibrio cholerae* Cells. Ann. Biochem. & Exper. Med. Calcutta. 1956, Apr.–May–June, v. 16, No. 1, 61–4. [11 refs.]

“1. The cells of six different strains of *V. cholerae* were analyzed for their protein and amino-acid contents.

“2. Leucines, phenylalanine, methionine, valine, tyrosine, alanine, threonine, glutamic acid, lysine, aspartic acid, cysteine, cystine, proline, and tryptophane are found to be present in all strains analyzed by paper chromatography.

“3. Some differences in concentration of individual amino-acid in the different strains of *V. cholerae* have been observed.”

SHAW, Constance. **Effect of Blood on the Viability of Dried Cultures of Cholera Vibrios.** [Correspondence.] *Nature*. 1956, Dec. 15. v. 178, 1352-3.

Vibrios are unduly susceptible to drying by sublimation [*Bull. Hyg.*, 1947, v. 22, 718; 1949, v. 24, 795]. The present author confirmed this between 1949 and 1954 on 22 strains of *Vibrio cholerae* grown on Lemco agar and dried in suspensions by the spin-freeze method. Viable counts made on the original suspensions and on reconstituted dried material at intervals dropped rapidly. Lemco broth was used for reconstitution and as diluting fluid.

Higher viable counts were obtained by using 5% blood broth as a diluent or by plating Lemco broth dilutions on blood agar. Hence blood seemed to provide an essential factor for the recovery of the vibrios from the dried state which serum did not adequately supply.

To test the possibility that some cells of *V. cholerae* can grow on agar and others cannot do so without the addition of blood, subcultures were made from the highest dilutions surviving on blood and on Lemco agar and these were redried by the same method. So far the theory of a heterogeneous population has not been supported.

The results of the comparative viable counts are tabulated.

H. J. O'D. Burke-Gaffney

GUPTA, N. P., GUPTA, S. P., MANGALIK, V. S., PRASAD, B. G. & YAJNIK, B. S. **Investigations into the Nature of the Vibrio Strains isolated from the Epidemic of Gastro-Enteritis in Kumbh Fair at Allahabad in 1954.** *Indian J. Med. Sci.* 1956, Oct., v. 10, No. 10, 781-91. [29 refs.]

During the Kumbh fair in Allahabad in 1954 an outbreak of acute gastro-enteritis occurred, a total of 330 patients being admitted to hospital [this *Bulletin*, 1955, v. 52, 447]. The fatality rate was 2.7% including patients who died of pneumonia or other complications. Of the patients who survived 75% were discharged from hospital in 48 hours. Of 144 stool specimens examined 53 yielded vibrios on culture which differed in their characters from *V. cholerae*. A number of river water samples were examined at the same time and non-agglutinable vibrios were isolated from 23.5% of them. The characters of 36 of the faecal strains and of 6 of the water strains were investigated in detail.

Agglutination and agglutinin-absorption tests showed all the strains which had been isolated from the gastro-enteritis cases to be serologically closely related or identical and one of the river strains was of the same O type. None of the vibrios belonged to the GARDNER and VENKATRAMAN O groups I, II, III, V or VI [this *Bulletin*, 1935, v. 32, 769] (group O IV serum was not available for test). All the faecal strains were haemolytic and gave the fermentation reactions of Heiberg's type V.

As a possible indication of the pathogenicity of the strains the effect of inoculating cultures into the isolated loop of rabbit intestine was tested. A preliminary test with *V. cholerae* resulted in the development of marked distension of the segment with intense congestion of the gut wall and the appearance of a fibrinous exudate on the outer surface of the loop. The contents showed a haemorrhagic whitish fluid containing degenerated cells. When the test was carried out with 8 strains from the gastro-enteritis cases similar changes were produced by 7 of them. Results were negative with 3 of the river strains which were tested. [The river strain R6 which had been found to be identical with the faecal strains does not appear to have been tested.] Results were also negative with the El Tor vibrio, *V. metchnikovi* and several other vibrio strains and with a number of organisms not belonging to the vibrio group. The question is discussed at some length whether vibrios other than classical *V. cholerae* may be pathogenic. The results with the tests in the rabbit intestine are taken to lend some support to the idea that some of them may be pathogenic. "The authors suggest that many of the so called 'inagglutinable' strains are capable of producing clinical cholera. But the antigenic structure and choleraogenicity of vibrios are independent attributes and may be dissociated. Hence to define 'true' cholera vibrio, a search for the mechanism and the test for choleraogenicity alone would provide the decisive answer."

J. Taylor

HUSAIN, S. S. & BURROWS, W. **Studies on Immunity to Asiatic Cholera.**

VIII. The Virulence of Strains of *Vibrio cholerae* for the Mouse.

J. Infect. Dis. 1956, July-Aug., v. 99, No. 1, 90-102. [19 refs.]

It is recognized that there is no laboratory procedure for the determination of the virulence of *V. cholerae* for man and there are no reliable criteria for the purpose. The relative virulence of vibrio strains has sometimes been inferred from the results of intraperitoneal infections in mice with graduated suspensions of the vibrios in mucin, but the fatal fulminating bacteraemia produced in such tests bears no resemblance to the localized enteric infection of human cholera.

The authors have carried out a study on the subject in the attempt to correlate mouse virulence with virulence for man as inferred from the conditions of isolation of strains. For the purpose *V. cholerae* strains were obtained from 47 cases of cholera occurring during an epidemic period in Calcutta with precisely known histories. The number of hours from the onset of the attack at which the primary isolations were made were known and in each case subsequent daily cultures were made until death or discharge from hospital. A series was thus obtained which represented all stages of the disease. All strains were typical *V. cholerae*, but some of the isolates obtained after the third day were R forms. Before these isolations a study had been made on the colonial characters of strains from a number of sources and it had been found that, on a thionine-glycerol

agar, 4 types could be defined. Of these, one form, designated the "granular chromatic" type, was the only form appearing on the primary isolation plates and only cultures showing this form were used in the study. The LD50 dose of strains from 4 fatal and 15 non-fatal Calcutta cases by intraperitoneal injection in mice in mucin suspension was determined by using 6 transplants from the primary isolation, by a technique of which the details are given. The results were used to test the assumption that strains having the greater virulence for man would be isolated from patients dying within 24 to 48 hours, and that those from non-fatal cases would be of lower virulence. The mouse virulence of isolates from fatal cases, however, was found to be not significantly different from that of isolates, early or late, from non-fatal cases. It is concluded that human cholera may be caused by strains of either high or low mouse virulence. As the mouse virulence test failed to show any apparent relation to inferred human virulence, an investigation by quantitative blood culture was applied to mouse infections with some of the vibrio strains for the purpose of following the development of bacteraemia, blood being taken at first at 2-hour intervals and later at 4- to 6-hour intervals or longer. A total of 16 strains were examined by this method, 7 being from fatal cases, 5 from non-fatal cases and 4 being R strains. The mean fold increase in the blood per 2-hour interval and the mean level of bacteraemia immediately preceding death were taken as criteria. The results of these examinations are summarized as follows:—

"Infection with O group I strains rapidly disseminated from the peritoneal cavity infection, with 1 to 10% of the inoculum cultivable from the blood at 2 hours, while R strains showed less than 0.005% of the inoculum present in the blood in the same time. It was found that the mean fold increase in numbers of O group I strains of *V. cholerae* cultivable from the blood was 20.1 for strains isolated from fatal cases of the disease in contrast to 5.5 for strains isolated from non-fatal cases. Contrariwise, the mean level of bacteraemia reached just before deaths began to occur was approximately 438,900 for strains of fatal origin, and 5,512,500 for strains of non-fatal origin. The data are taken to suggest that vibrio strains isolated from fatal cases of the human disease are more invasive in the mouse than those isolated from non-fatal cases".

J. Taylor

MUKERJEE, S. & ROY, U. K. G. **Studies on Cholera-Infection and Cholera-Immunization: Part I. Attempts for Demonstration of Endotoxin and Agglutinin of *Vibrio cholerae* in the Serum of Cholera Patients.** *Ann. Biochem. & Exper. Med.* Calcutta. 1956, Apr.-May-June, v. 16, No. 1, 1-4. [10 refs.]

"1. Injection into rabbits of large doses of sera obtained from cholera patients during the early stage of the disease failed to produce any toxic reaction or develop agglutinating antibodies in their sera.

"2. The mode of action of cholera vibrios and their toxin is discussed."

BANERJI, R. **Treatment of Circulatory Failure in Cholera with Plasma and Plasmosan.** *Burma Med. J.* 1955, Oct., v. 3, No. 4, 18-21.

Plasma was given intravenously in doses of 250 to 750 ml. to 45 shocked cholera patients who did not respond to routine saline therapy. Except in two fatal cases response was satisfactory.

Plasmosan, which is an isotonic colloidal solution of polyvidone (in an average dose of 540 ml.), was used as a cheap substitute for plasma in 114 similar cases with systolic blood pressures ranging from 40 to 70 mm.Hg.; 84 patients survived. It was effective in moderately severe cases with falling blood pressure, but was not successful in severely collapsed patients who had been in that condition for some time. Plasma was better for such patients.

The time taken over administration of plasma and Plasmosan is not stated.

B. G. Maegraith

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

CAPOCACCIA, L. Velocità di moltiplicazione di una popolazione amebica con flora associata in diversi terreni culturali. [**Rate of Multiplication of *Entamoeba histolytica* with its Concomitant Flora in Diverse Media**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1956, June, v. 37, No. 6, 327-33. English summary (3 lines).

The author records observations on the growth of *Entamoeba histolytica* with a mixed flora in 5 culture media (two modifications of Boeck-Drbohlav medium, Balamuth-Sandsa medium, Difco Endamoeba medium and a medium with egg-liver-agar base). The best results in all these media were obtained with small inocula.

C. A. Hoare

CAPOCACCIA, L. Velocità di moltiplicazione di una popolazione amebica in presenza di flora batterica ridotta a 2 specie in diversi terreni culturali antibiotizzati. [**Rate of Multiplication of Amoebae in Cultures with Two Species of Bacteria**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1956, July, v. 37, No. 7, 367-72. English summary (8 lines).

Cultures of *Entamoeba histolytica* were grown in various media in the presence of antibiotics (penicillin and streptomycin), which reduced the concomitant flora to 2 species of bacteria: an anaerobic bacillus and *Bact. coli*. It was found that the greatest number of generations of amoebae

was reached with small inocula, containing 20–30 individuals per cc., and that—even when trebled—larger inocula did not produce appreciably greater growth. These results were in contrast to those obtained in cultures with a rich and uninhibited flora.

C. A. Hoare

NEAL, R. A. **Proteolytic Enzymes in *Entamoeba histolytica*.** [Correspondence.] *Nature*. 1956, Sept. 15, v. 178, 599.

The author has demonstrated the presence in *Entamoeba histolytica* of proteolytic enzymes as follows. A sterile extract of culture amoebae was incubated at 37°C. with casein solution and a buffer to give a range of pH 4.0–8.5, and the reaction was stopped by addition of trichloroacetic acid. The resulting hydrolysis of casein was assessed with Folin-Ciocalteu phenol reagent in terms of $\mu\text{gm./ml.}$ of tyrosine. The extract showed high hydrolytic activity between pH 6.5 and 8.5, with a maximum at pH 8.0, when the activity increased progressively for 2 hours, after which it decreased. The proteolytic enzymes in extracts of this strain also dissolved formalin-denatured gelatine and reduced the viscosity of gelatine solutions. As regards the bacterium, *Bact. coli*, which accompanied the amoeba in culture, when tested under the same conditions it showed no proteolytic activity.

C. A. Hoare

MOLINARI, V. Nouveaux essais d'action du froid sur les trophozoites de divers protozoaires parasites. [**Effect of Cold upon Trophozoites of Parasitic Protozoa**] *Bull. Soc. Path. Exot.* 1956, Mar.–Apr., v. 49, No. 2, 254–60. [22 refs.]

The author records the results of experiments on exposure of trophozoites of *Entamoeba histolytica* and *E. invadens* to low temperatures. The liquid containing the amoebae in semi-solid cultures was collected in Pyrex tubes, ampoules or capillary tubes, and placed in carbon dioxide snow or liquid nitrogen.

The results were as follows. After exposure to -20°C. for 30 minutes to 2 hours and thawing at $+20^{\circ}\text{C.}$, the amoebae were motile and viable, as shown by subcultivation. However, the amoebae were killed by exposure between 2 and 20 hours to -70°C. and between 30 seconds and 20 hours to -180°C. , when thawed either slowly at room temperature or rapidly in the incubator ($+37^{\circ}\text{C.}$). On the other hand, after rapid immersion of tubes in liquid nitrogen (-180°C.), followed immediately by immersion in a water bath at $+56^{\circ}\text{C.}$, *E. invadens* remained alive.

It is concluded that death of the amoebae takes place at a critical temperature, when alterations, due to ice-crystallization, take place in the plasmagel system of their body during the period of transition between the solid and liquid states in the course of freezing and thawing.

C. A. Hoare

VALENTINO, L. La reazione di immobilizzazione nell'amebiasi. [**Immobilization Reaction in Amoebiasis**] *Riv. Istituto Sieroterap. Ital.* 1956, July-Aug., v. 31, No. 4, 310-17, 5 graphs. English summary.

In this paper the author describes experiments on the immobilization reaction in amoebiasis, in which the results obtained by COLE and KENT [this *Bulletin*, 1954, v. 51, 385] were confirmed and extended. For this test 0.05 cc. of immune rabbit serum (obtained by intravenous inoculation of a suspension of *Entamoeba histolytica* in culture) or serum from human cases of amoebiasis was first inactivated for 30 minutes at 56°C., after which it was mixed on a slide with an equal amount of culture fluid containing numerous amoebae, and the preparation was mounted under a coverslip, the edges of which were sealed with paraffin wax. The percentage of immobilized amoebae was determined by microscopical examination of the preparation in a warm chamber at 37°C. In control preparations, serum was substituted by Locke's fluid. Amoebae reacting positively lose their motility and become rounded, while their nucleus becomes visible and the cytoplasm around it becomes denser.

The results of the experiments were as follows. In preparations of immune rabbit serum, normal rabbit serum, human serum from patients and normal subjects, observed for periods up to 2 hours, the percentages of immobilized amoebae were 79, 15, 88 and 4, respectively, reaching a maximum after one hour's exposure and remaining unchanged up to 8 hours. It was also shown that dilution of the immune sera brought about a progressive loss of power to immobilize the amoebae and its disappearance at 1 in 16. On the other hand, there was no difference in the reaction to heated or unheated sera at 56°C., but exposure to 63°C. for 30 minutes resulted in a considerable fall in the number of immobilized amoebae. A comparison was also made of the complement-fixation and immobilization tests, with the sera from 57 patients suffering from amoebiasis. While the former test gave positive results in 35 cases, the latter reacted in 50.

It is suggested that further work is required to determine the exact mechanism of the immobilization reaction (which is regarded as an immunological phenomenon) and to assess its practical value in the diagnosis of amoebiasis.

C. A. Hoare

KRÜMMEL, H. Entökie einer Amöben-Species im menschlichen Auge. [**An Intraocular Human Amoeba**] *Arch. f. Hyg. u. Bakt.* 1956, June, v. 140, No. 4, 253-63, 17 figs.

In histological sections of the eyes removed from 3 patients (2 adults and 1 infant) the author found accumulations of bodies which he regards as amoebae. They were seen in various parts of the eye, mostly lying free in spaces between the tissues, especially in the episclera and retrobulbar regions in the case of the adults, and between the optic nerve sheaths in the infant. The "amoebae" were represented by trophozoites

measuring from 15 to 70 μ in diameter, the total number seen in the 3 patients being 922; their distribution in various parts of the eye is shown in a table. The ecto- and endoplasm in the amoebae were clearly differentiated, and the single nucleus was of the massive or vesicular type, with fine peripheral chromatin granules and an eccentric karyosome. The cytoplasm of the smaller amoebae was filled with clear vacuoles, while in large ones there were numerous inclusions, which stained dark with Heidenhain's stain.

The amoeba, which could not be identified with any of the species recorded from man and lower animals, is provisionally named *Entamoeba ocularis* sp.n. Since no pathological changes were observed in the ocular tissues, the new organism is regarded as being non-pathogenic.

The paper is illustrated by photomicrographs showing the amoebae *in situ*.
C. A. Hoare

MASSE, A., MABILLE, E., MERLE, H. & CHEBAT, J. Pleurésie gauche, manifestation prééminente d'un abcès amibien du foie à forme pseudo-splénique. [**Left-Sided Pleurisy as the Predominant Feature of an Amoebic Abscess of the Liver of the Pseudo-Splenic Type**] *Bull. et Mém. Soc. Méd. Hôpit. de Paris*. 1956, Nos. 29/30, 961-4.

WILMOT, A. J., POWELL, S. P. & ELSDON-DEW, R. **Diphetarstone in the Treatment of Acute Amoebic Dysentery.** *J. Trop. Med. & Hyg.* 1957, Jan., v. 60, No. 1, 16-18. [12 refs.]

This compound is claimed by French workers [see this *Bulletin*, 1953, v. 50, 415; and later] to be an effective therapeutic amoebicide, particularly in the control of acute amoebic dysentery.

44 Africans with acute amoebic dysentery have been treated with the drug. The dose was 2.5 gm. [by mouth] daily for 10 days. A month after the start of treatment 32 (73%) of them were free from symptoms and signs, and their stools of parasites; 3 still had unhealed rectal ulcers, but no parasites in the stools; 6 were not materially benefited; and 3 clinically were well but were passing cysts in the stools. No toxic side effects attributable to the drug were noted. Though Diphetarstone is inferior to the wide-spectrum antibiotics in the immediate control of acute amoebic dysentery, it compares favourably with other direct amoebicides in this particular respect.
A. R. D. Adams

DE COURSEY, J. D. & OTTO, J. S. **Contamination of Fresh Vegetables by *Endamoeba histolytica* and Studies on Superchlorination.** *J. Egyptian Pub. Health Ass.* 1956, v. 31, No. 1, 13-51, 11 figs. [44 refs.]

The authors point out the danger of contamination of uncooked vegetables and fruit with human faecal matter containing cysts of

Entamoeba histolytica, in countries where night soil is used as fertilizer. In Egypt soil is treated in this way before planting but rarely when crops are growing; therefore, it is claimed, contamination is more likely in the course of harvesting and when the plants are washed in polluted irrigation canals and handled in the market. In this connexion it is noted that the incidence of amoebiasis in rural areas of Egypt is over 50% of the population.

In order to assess the potential danger of infection, the authors carried out a study of the incidence of intestinal parasites on fresh vegetables in the Cairo area, and of possible methods of decontamination. Over 100 lettuces, as well as carrots, green onions, radishes, celery, parsley and strawberries, were washed and the resulting suspension was centrifuged or floated by the zinc flotation method, after which the sediment or the surface film of the fluid (as the case may be) was stained by the MIF method and examined microscopically. However, no cysts of *E. histolytica* were found in any of the material examined, but nematode ova and larvae (of undetermined origin) were seen. Likewise, no amoebic cysts were detected in samples of the soil on which the vegetables were grown or in the canal water used for washing them. In spite of these negative results, precautionary measures should be taken before consuming raw vegetables in view of the high endemicity of amoebiasis in Egypt.

The rest of this paper is devoted to chlorination tests, which were carried out in order to determine the rate of reduction of chlorine by organic nitrogen, acids and other chemicals in the plants, as well as the amount of hypochlorite required to maintain a cysticidal concentration in water. The results (discussed in detail and tabulated) indicate that bleaching powder containing 34-36% free chlorine, used at the rate of half a teaspoon per half a gallon of water (which gives an initial concentration over 100 p.p.m.), is sufficient to maintain a cysticidal concentration through 30 minutes' exposure of the vegetables tested.

C. A. Hoare

SIMITCH, T., RAMSINE, S., PETROVITCH, Z., CHIBALITCH, D. & JANKOV, L.
Action de l'eau chlorée, du chlorure de chaux, de la chloramine et de l'iode sur la vitalité des kystes d'*Entamoeba dysenteriae*. [**Effect of Chlorine Water, Chloride of Lime, Chloramine and Iodine upon the Vitality of Cysts of *Entamoeba histolytica***] *Arch. Inst. Pasteur d'Algérie*. 1956, June, v. 34, No. 2, 205-17. [13 refs.]

Since in Yugoslavia amoebic infection is usually contracted from water contaminated with cysts of *Entamoeba histolytica*, the authors have carried out comparative tests of the cysticidal effect of chlorine water, chloride of lime (of which the active agent is calcium hypochlorite), chloramine and iodine when added to water experimentally polluted with faecal matter of human contact carriers. For this purpose the faeces, containing from 750 to 30,000 cysts per litre, were suspended in distilled

or tap water in ratios from 1:1,000 to 1:40,000. The suspensions, in which the nitrogenous content was 0.18–2.4 mgm. per litre, and that of organic matter 5.0–83.0 mgm. per litre, were treated with varying amounts of the disinfectants, the chlorine or iodine content of which was known. After exposure for 15–60 minutes, the disinfectants were neutralized with sodium thiosulphate, the suspensions were centrifuged, and the viability of the cysts was determined by culture in Löffler-serum medium.

It was found that the cysticidal action of the chlorine compounds depended both on the pH of the suspensions and on their content in nitrogenous and organic matters. But while the pH was lowered by chlorine water it was raised by chloride of lime and chloramine, the fluctuation depending on the amount of the disinfectant added. Also, the lower the pH and the nitrogenous and organic content, the lower was the dose required to kill all the cysts. However, the addition of iodine to the faecal suspension did not alter the pH. The pH in faecal suspensions treated with chloride of lime and chloramine could be lowered by addition of 10 cc. N/10 HCl per litre. By this procedure it was demonstrated that the cysticidal action of chloride of lime was superior to that of all the other chemicals tested. Thus a dose containing 10 mgm. per litre of active chlorine in the acidified medium killed all the cysts of *E. histolytica* after exposure for 45 minutes, even in suspensions with a total nitrogen content of 1 mgm. per litre, while in suspensions with half this amount of nitrogen, 6 mgm. per litre of active chlorine produced the same effect after one hour. It is concluded that chloride of lime, added in the doses stated, is capable of purifying water polluted with *E. histolytica* for drinking purposes.

The chloride of lime [bleaching powder] used contained 20–22% of active chlorine.

C. A. Hoare

MUDROW-REICHENOW, Lilly. Spontanes Vorkommen von Amöben und Ciliaten bei Laboratoriumstieren. [**Spontaneous Occurrence of Amoebae and Ciliates in Laboratory Animals**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1956, June, v. 7, No. 2, 198–211, 1 fig. [22 refs.]

The use of laboratory animals for testing amoebicidal drugs has revived the interest in the natural amoebic infections among them. Since these amoebae are liable to be mistaken for *Entamoeba histolytica*, thereby causing confusion in the results of the screening experiments, it is necessary to detect and differentiate them in the laboratory animals.

The author records the results of examination, in fresh and Heidenhain-stained preparations, of the intestinal contents of rabbits, German and golden hamsters, guineapigs, rats, mice and macaque monkeys. Out of 163 rodents, comprising animals discarded from other experiments and those obtained from dealers, 33% were found to harbour in their caecum

light infections with amoebae of *E. muris* type. The same amoebae were also detected among rodents experimentally infected with *E. histolytica*. Cysts of *E. muris* were only rarely observed, and all attempts to cultivate them in the usual media were unsuccessful. In addition to amoebae, the rodents occasionally harboured intestinal flagellates and coccidia, while the ciliate *Cyathodinium piriforme* is reported for the first time from guineapigs in Europe. Among 7 macaque monkeys examined, amoebae were found in 6. They were represented by *E. chattoni*, differing from *E. histolytica* in the structure of the mature cysts which is uninucleate and contains numerous small granular or rod-shaped chromatoid bodies.

C. A. Hoare

SCHNEIDER, J. La lambliaze. Aspects cliniques et thérapeutiques. [Clinical and Therapeutic Aspects of Giardiasis] *Maroc Méd.* 1956, Nov., v. 35, No. 378, 1047-51. [19 refs.]

A review.

DEY, N. C. & KUAR, B. One Day Treatment of Giardiasis with 7-Chloroquinoline. *J. Indian Med. Ass.* 1956, Nov. 16, v. 27, No. 10, 355.

In the last 6 years the authors have found some 5% of cases of *Giardia* infection in 10,753 samples of faeces examined in the Assam Medical College Hospital. A quarter of these showed trophozoites as well as cysts. They report a study of 50 of these cases. 60% of the patients were under 10 years of age and 90% had abdominal symptoms, which were listed.

These patients were treated with amodiaquine which has already been tried in giardiasis [this *Bulletin*, 1954, v. 51, 269, 1251; 1957, v. 54, 44]. Adults were given one tablet (0.2 gm.) thrice daily, children between 5 and 10 years received half a tablet and children below 5 years one-third of a tablet.

On the 3rd day, 47 patients no longer showed *Giardia* in the stools: on the 10th day 5 of these were positive, but became negative after a second course of single-day treatment.

No side-effects were reported and the relapse rate in this one-day treatment was low.

H. J. O'D. Burke-Gaffney

HAIBA, M. H. Further Study on the Susceptibility of Murines to Human Giardiasis. *Ztschr. f. Parasitenk.* 1956, v. 17, No. 5, 339-45, 3 figs. [21 refs.]

The author describes the results of experimental infection of murine rodents with the human intestinal flagellate, *Giardia intestinalis*. In reviewing the conflicting results obtained by previous authors in similar experiments, it is pointed out that no allowance was made by them for factors which are now known to be unfavourable to parasitization with

Giardia, viz., starvation of the host [this *Bulletin*, 1923, v. 20, 442], which produces an alkaline reaction in the small intestine (pH 0.3–1.1) [*ibid.*, 1952, v. 49, 806], and the use of old cysts for inoculation [*ibid.*, 1927, v. 24, 870]. In the present experiments, the author accordingly used suspensions of fresh faecal specimens (3–4 hours old) from patients infected with *G. intestinalis*, which were introduced by means of a fine plastic catheter into the stomach of “clean” well-fed laboratory-bred and wild mice and rats (*Mus musculus*, *Rattus norvegicus* and *R. rattus*).

Infection with the human flagellate established itself successfully only in albino and wild brown rats, but not in black rats or mice. The greatest concentration of flagellates occurred from the third quarter of the small intestine up to the caecum, with an optimum pH 6.5.

The human *Giardia* in experimentally infected rats proved to be smaller than in the human hosts, but differed markedly from the rodent parasites, *G. muris* and *G. microti*. The cysts of *G. intestinalis* were found to have an oval outline, with rounded poles, and asymmetrical sides, one being convex, the other somewhat concave.

C. A. Hoare

AREÁN, V. M. & KOPPISCH, E. **Balantidiasis. A Review and Report of Cases.** *Amer. J. Path.* 1956, Nov.–Dec., v. 32, No. 6, 1089–1115, 14 figs. on 7 pls. [Numerous refs.]

This paper, from the School of Tropical Medicine in Puerto Rico, is one of the most complete studies of balantidiasis yet to be published. It is based upon 5 post mortems of patients who died with *Balantidium coli* dysentery as well as upon pathological studies of 2 appendices removed surgically.

As has been emphasized by all who have worked on balantidiasis the lesions are similar to those of amoebic dysentery. The differentiation can only be made by the identification of the parasite, which can be found at the invading edge of the ulcers or at the periphery of submucosal abscesses. Lesions are seen also deep in the intestinal wall and the parasites are commonly within lymphatic vessels. In the 2 cases of appendicitis abundant balantidia were present in the base of the ulcers or in the wall or both: one ulcer had perforated. One instance in which balantidial ulcers were present in the terminal ileum is also reported.

The section on geographical distribution is particularly complete, and the bibliography of human balantidiasis provides a valuable addendum to the paper and comprises 78 references. The paper also discusses the parasite, its metabolism, the epidemiology and pathology of the disease and the clinical features and treatment.

Philip Manson-Bahr

See also p. 506, GÓMEZ RODRÍGUEZ, Una mezcla fijadora original para los estudios protozoológicos. [New Fixative for Protozoological Studies]

RELAPSING FEVER AND OTHER SPIROCHAETOSSES

SPARROW, Hélène. Emploi des ratons nouveau-nés pour entretien de *Borrelia recurrentis*. [**Use of Newborn Rats in the Maintenance of *Spirochaeta recurrentis***] *Bull. Soc. Path. Exot.* 1956, July-Aug., v. 49, No. 4, 630-31, 4 figs. on 2 pls.

The following is a translation of author's summary:—

We have several times stressed the difficulties of maintaining strains of *Spirochaeta recurrentis* in the laboratory [this *Bulletin*, 1956, v. 53, 1238].

The simultaneous passaging of strains from louse to louse and from newborn mice to newborn mice has not prevented accidents whose cause was often unknown. The possibility of passaging parallel strains in newborn rats should not be overlooked. It offers certain advantages and enables a clearer distinction between strains to be made. Even so, the rat, like the mouse, is an intruder in the natural cycle of the disease.

John Rathborn

YAWS AND OTHER TREPONEMATOSSES

AUGÈRE, R. & LACOUR, M. Les tréponématoses en Nouvelle-Calédonie. Enquête épidémiologique et sérologique. [**The Treponematoses in New Caledonia. An Epidemiological and Serological Investigation**] *Méd. Trop.* Marseilles. 1956, July-Aug., v. 16, No. 4, 497-513, 2 figs. & 2 maps.

The authors report the findings of a survey made in New Caledonia. Yaws and syphilis were known to exist in the island but were not regarded as diseases of major importance and hence had not previously been adequately surveyed. The present investigation was undertaken in 1955 and consisted of the clinical and serological examination of 2,200 of the indigenous people. This number is approximately one-tenth of the total population and was made up of samples from all locations except Nouméa, which was excluded as the population there is too diverse and unstable to yield consistent information. In the district of Ponérihouen the survey was limited to those who had not been examined in a previous investigation. The authors record in detail the method of collecting blood in capillary tubes and its dispatch to a central laboratory where the serology was determined by the VDRL and Kline flocculation methods. Using these tests, sufficiently accurate for such a survey, the investigators were able to avoid the expense and difficulties of collecting and dispatching larger blood samples. The clinical examinations were made by a number of practitioners but according to a uniform plan.

The authors were able to relate the incidence of seropositive findings in

relation to age with the history or presence of yaws or syphilis in the community. Marked differences were found between locations. The overall incidence of yaws was 9.1% of which 5.3% represented active disease. Syphilis showed an overall incidence of 4.4%. Yaws occurred in certain localized rural areas and syphilis predominantly in industrial and agricultural centres. The distribution of the diseases in relation to age and location gave indications as to the mode of spread. The information obtained would enable prevention and treatment to be undertaken on a rational basis.

Frederick J. Wright

KRANENDONK, O. **The Value of the Chediak VDRL Test in Yaws Serology compared with the Standard VDRL-Slide Test.** *Documenta Med. Geograph. et Trop.* Amsterdam. 1956, Dec., v. 8, No. 4, 365-74, 1 graph.

Netherlands New Guinea covers 400,000 square kilometres and has a population of 700,000. Yaws is endemic in most areas. Mass treatment, first with arsenicals and later with penicillin, has lowered the clinical prevalence but latent cases remain.

For detecting yaws the VDRL quantitative test is the best but in outlying areas this is not practicable and the Chediak test is advised. This is carried out on a drop of blood dried on a slide by adding 0.03 ml. of 3.5% NaCl, stirring and then adding 0.03 ml. of VDRL antigen suspension and rotating at 180 r.p.m. for 3 minutes; results are read at once with 60 × magnification. False positive reactions, when carried out by trained technicians, varied from 0.4% in infants to 12.4% in adults. The Chediak test was slightly less sensitive than the VDRL test particularly in cases where the reagin titre was low; in 1,014 cases the Chediak showed 70.3% reactivity compared with the VDRL test. The latter test is highly sensitive in all stages of yaws and is very little affected by treatment except in very early cases.

The Chediak test was employed in 89 cases of clinical yaws and was positive in 86, doubtful in 1 and negative in 2; in 12 suspected cases it was negative in 7 and positive in 5. Storage of specimens results in loss of reactivity; after 3 weeks the percentage of sensitivity of 144 specimens fell to 84.

In sample re-surveys in two areas the Chediak reactivity rate fell from 64.5% to 42.1% and from 59% to 46%, respectively; this was considered to result from a decrease of mean reagin titre after mass treatment.

It is concluded that the Chediak test is useful though not so sensitive as the VDRL test; the number of false positives [many of which would be regarded by some people as doubtful] is not great; the test is nearly always positive when clinical signs are present; sample surveys with this test give good epidemiological information and the test is quick and easy to perform in the field.

T. E. Osmond

LEPROSY

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

TORSUEV, N. A. [Edited by.] [**Collected Works on Leprology and Dermatology**] No. 7. 583 pp., numerous illustrations. [In Russian.] 1956. Rostov-on-Don: Rostovskoe Knizhnoe Izdatelstvo.

This volume, which is No. 7 of a series, contains 42 papers representing work carried out in 1954 by the staff of the Rostov Leprosarium and the dermatological department of the Rostov Institute of Medicine, and also by workers in leprosaria in other parts of the Soviet Union. The first 147 pages are occupied by 3 papers on the classification of various types of leprosy in which much space is devoted to a historical review. Various aspects of the morbid anatomy of the disease are described in the next 9 papers, which are followed by 7 papers on treatment. The results of an epidemiological survey carried out in Sakhalin are briefly described. 40 Koreans with leprosy from southern Sakhalin were encountered in the Irkutsk leprosarium, and the disease was also present in convicts who had been transported to Sakhalin from other parts of Russia. The work ends with a number of papers on miscellaneous subjects, including the treatment of lupus erythematosus and psoriasis, and the description of an unusual case of xanthomatosis.

D. J. Bauer

BECELLI, L. M. & ROTBERG, A. Contribuição para o estudo da herança de resistência à infecção leprosa: a lepra no Estado de São Paulo (Brasil) segundo a naturalidade. [**Contribution to the Study of Heredity and Resistance to Leprous Infection: Leprosy in the State of São Paulo (Brazil) according to Nationality**] *Rev. Brasileira Leprologia*. S. Paulo. 1956, Jan.—June, v. 24, Nos. 1/2, 37–47. [22 refs.] English summary.

Leprosy in the State of São Paulo is noticed most in immigrants and especially in Italians. If prevalence was due to national heredity then racial resistance should be stronger among the Italians than in the indigenous population, because leprosy appeared earlier in southern Europe than in America, and the susceptible strains of the population would have been eliminated earlier.

Many factors connected with exposure to infection are to be taken into consideration, and the authors therefore think that the type of leprosy which develops is more important in estimating resistance than the frequency of the disease in any community. It has been found that the lepromatous form is more frequent in the endogenous population than among immigrants, but that the children of immigrants are more liable to develop the lepromatous form than the children of the indigenous

people. There is a likelihood that the greater frequency among foreigners when they first arrive in the country is due to the strain of adaptation to new conditions of life. They are more likely to seek medical assistance and their condition is therefore diagnosed more readily. They are also more liable to be exposed to infection because of their ignorance of the disease.

Ernest Muir

HANKS, J. H., with the assistance of Tobey BACKERMAN. **Retention and Differentiation of Carbol-fuchsin-Stained Mycobacteria in Diagnostic Films.** *Amer. Rev. Tuberculosis*. 1956, Oct., v. 74, No. 4, 597-607.

[A review of this paper appears also in the *Bull. Hyg.*, 1957, v. 32, 192.]

This paper deals with films (smears) of all types of pathogenic mycobacteria; the following particulars are those that have particular significance in leprosy. To prevent loss of mycobacteria from the surface of diagnostic films a surface coat of 5% serum is first applied to the slide and dried. On this the smear is made. After drying, the slide is placed on a hot plate over boiling water for 30 seconds and carbol-fuchsin is applied for 30 to 60 seconds, and the slide rinsed *gently* in water. The preparation is differentiated for 30 to 60 seconds with 4% sulphuric acid containing 0.2% methylene blue (final concentrations), and rinsed *gently* in water. The carbol-fuchsin is prepared by adding 5% phenol in distilled water to 3% fuchsin dissolved in 95% alcohol. Sulphuric acid was found to be preferable to acid-alcohol for differentiation showing more acid-fast bacilli in leprosy smears in the proportion of 70:100. The process is simplified by mixing the counter-stain with the acid, so that only two procedures are required.

Ernest Muir

HANKS, J. H., with the assistance of Tobey BACKERMAN. **Retention and Differentiation of Mycobacteria in Tissue Sections.** *Amer. Rev. Tuberculosis*. 1956, Oct., v. 74, No. 4, 608-15.

[A review of this paper appears also in the *Bull. Hyg.*, 1957, v. 32, 192.]

It was found that when rapid methods of deparaffinization were used in sections of lepromatous skin large numbers of bacilli were removed from the sections, especially if alcohol were used to remove the paraffin solvent. This was shown by the large numbers of bacilli in the paraffin rinsings, and by the myriads of bacilli released in properly deparaffinized sections when a loop of xylol and then one of alcohol were placed at the margin of such sections. In sections where comparatively few mycobacteria are present, as in non-lepromatous leprosy or tuberculosis, it was found that considerably more bacilli were found after cautious deparaffinization

(using xylene 20%, mineral oil 80% for 15 minutes and rinsing twice with xylene), than after rapid deparaffinization (using xylene 2 minutes, xylene rinse twice, alcohol rinse twice). In 12 counts by each of these methods, with adjacent serial sections, there was a difference of 193 in favour of the slow method, that is the difference between 751 and 558 bacilli. In sections as in films sulphuric acid was found much more favourable for decolorization and differentiation than acid alcohol.

Ernest Muir

FLOCH, H. Hémagglutination dans la lèpre. Essai à l'aide d'une "lépromine" ultrasonnée. [**Haemagglutination in Leprosy. A Trial with "Lepromin" subjected to Ultra-Sonic Waves**] *Arch. Inst. Pasteur de la Guyane Française et de l'Inini*. Publication No. 399. 1956, July, 4 pp.

The author used as antigen in the haemagglutination test lepromin treated with ultrasonic radiation in the same way as he had previously used the ordinary lepromin [this *Bulletin*, 1953, v. 50, 422], except that in this test he used red cells of the 0 group. He chose 27 sera, of which 7 were from lepromatous patients, 3 from borderline, 5 from undifferentiated, and 5 from tuberculoid cases. Only 1 of the lepromatous sera was positive at a dilution of 1 in 64, another at a 1 in 4 dilution, and others at 1 in 16 to 1 in 64, but not at 1 in 2 to 1 in 8. Of the undifferentiated 2 were negative and the others positive only in tubes of high dilution. Of the tuberculoids 1 was positive at 1 in 4, but the others positive only in tubes of high dilution. The borderline sera were positive only in some of the last tubes, and 4 out of 6 normal sera showed this same characteristic.

The author does not consider that this antigen has any advantage over other antigens previously used, or that this test is of use in the classification of leprosy.

Ernest Muir

JOPLING, W. H. **The Clinical Features of Leprosy in the European.** *Central African J. of Med.* 1956, Nov., v. 2, No. 11, 390-93.

The timeliness of this short and clear guide to the diagnosis of leprosy is shown by some examples given of mistaken diagnosis connected with leprosy. A European consulted 15 doctors in South Africa [a country where leprosy is not at all uncommon] before seeing one who made the correct diagnosis. DOULL is quoted as saying that "The average duration of the disease at time of admission to the Carville Leprosarium in Louisiana is probably at least five years". Simple rules easily understood by the general practitioner are given for diagnosing and differentiating the two main types of leprosy—the lepromatous and tuberculoid; intermediate forms are passed over as showing characteristics of both main types.

This short, lucid description of leprosy, with special reference to the appearances in those with lighter-coloured skin, could with advantage be studied by all practitioners whether in endemic areas or in regions where leprosy is less common.

Ernest Muir

BROWNE, S. G. **Leprous Nerve Abscess: Report of Two Cases.** *Leprosy Review*. 1957, Jan., v. 28, No. 1, 20-24.

"Two cases of leprous nerve abscess associated with main nerve trunks in cases of tuberculoid leprosy are reported from the Belgian Congo. In one case, the tuberculoid lesion was long-standing and quiescent; in the other, cutaneous lesions had not made their appearance at the time the abscess was forming, but appeared later."

FLOCH, H. & DEHEZ, F. Mode d'action des sulfones dans la lèpre (X). Comment agissent la sulfone monoisopropylée et la sulfone diisopropylée administrées par la voie buccale. [**Mode of Action of Sulphones in Leprosy. (X) How do Monoisopropyl Sulphone and Diisopropyl Sulphone act when administered Orally**] *Arch. Inst. Pasteur de la Guyane Française et de l'Inini*. Publication No. 400. 1956, July, 8 pp.

These two preparations when tested in animals were well tolerated. Tested on tuberculous infection in mice, the monoisopropyl substitute appeared to be more active than the diisopropyl substitute, and equally active with DDS. The authors are inclined to think that the action of the monoisopropyl substitute may be due in part to its own molecule and not only to the DDS which it liberates in the body.

Ernest Muir

FLOCH, H. Activités thérapeutiques antilépreuses de la sulfone monoisopropylée et de la sulfone diisopropylée. [**Therapeutic Activities against Leprosy of Monoisopropyl Sulphone and Diisopropyl Sulphone**] *Arch. Inst. Pasteur de la Guyane Française et de l'Inini*. Publication No. 401. 1956, July, 6 pp.

3 patients were treated with diisopropyl sulphone, 200 mgm. daily, given orally for 6 days a week. 2 of these suffering from the tuberculoid type were very much benefited clinically within 5 months of treatment. 1 of them also showed much improvement histologically. It is too soon to say anything about the third, a borderline case.

With monoisopropyl sulphone 8 leprosy patients have been treated, the same dosage being given. Of these one has stopped treatment. 3 lepromatous cases have not been under treatment long enough to judge of progress. Of the 4 others 2 are lepromatous, 1 tuberculoid and 1 borderline; they have made remarkable progress bacteriologically, histologically and clinically within 4 to 7 months.

Both these drugs are tolerated remarkably well. Though 200 mgm. is regarded as the routine dose, only 100 mgm. per day is given during the first month. One of the lepromatous patients suffered from reaction.

Ernest Muir

HAYASHI, Y. & TACHIKAWA, N. **Effect of "Taifumin", a Powdered Colloid Preparation of Chaulmoogra Oil used intravenously as its Aqua Solution in the Treatment of Leprosy.** *Yokohama Med. Bull.* 1956, Apr., v. 7, No. 2, 74-8, 3 figs. on pl. [10 refs.]

The authors have found this preparation of chaulmoogra oil, given intravenously, useful in leprosy patients who have "doggedly resisted" or ceased to respond to treatment with Promin. In 13 such patients, 10 of whom were of the lepromatous type, treatment was effective in 4 who became bacteriologically negative, moderately effective in 2, slightly effective in 2, and ineffective in 1. In 2 the condition became aggravated and in 2 the effects were not yet known.

The preparation is made from chaulmoogra oil in the same way as fat-colloid-glucose was made from cod-liver oil, by evaporating it in a vacuum to cause the dispersal of minute oil particles which are deposited on the surface of pure glucose crystals, the droplets being 1-2 μ or less in diameter. Boiling and freezing do not cause fusion of the particles. This preparation is injected intravenously, 2.0 gm. of Taifumin, containing 0.1 gm. of chaulmoogra, being dissolved in 10 cc. of distilled water and heated at 60°C. to make a perfect colloid solution. It is injected 3-6 times a week. It does not cause embolism, endophlebitis or destruction of erythrocytes.

Ernest Muir

NICHOLAS, G. J. **Cortisone in the Complications of Leprosy.** *West Indian Med. J.* 1956, Sept., v. 5, No. 3, 196-200.

Differing views about the effectiveness of cortisone in the complications of leprosy led the author to test its effects in 26 patients on 76 separate occasions. For neuritis it was tried on 57 occasions and relief was obtained within 24 hours in 23 of these, and considerable improvement in those of the remaining patients who reported on the second day. In only 1 case was the treatment a failure, relapses occurring at more and more frequent intervals. In afebrile erythema nodosum leprosum no beneficial results were obtained. In febrile lepra reaction cortisone was used on 14 occasions, and in only 4 of these was it considered that continued use of the drug was not justified. Five days were taken as the maximum period of assessment. In 2 patients the treatment was highly successful, all signs disappearing within 3 days.

After observation of 4 months to a year no bad results have been found, but it was felt that unless there was improvement in the first few days cortisone should not be continued, as it might do more harm than good.

[Other recent reports on the use of cortisone in leprosy indicate that a bolder attitude as regards duration of treatment may be justified.] The author preferred injections of cortisone (50 to 200 mgm. daily for up to 7 days) to oral hydrocortisone, as he found that the former gave quicker results.

Ernest Muir

JOPLING, W. H. & COCHRANE, R. G. **The Place of Cortisone and Corticotrophin in the Treatment of Certain Acute Phases of Leprosy.** *Leprosy Review*. 1957, Jan., v. 28, No. 1, 5-10. [26 refs.]

One of the greatest handicaps in the treatment of leprosy is the allergic conditions which may occur spontaneously or be induced by sulphone treatment. These are erythema nodosum leprosum, inflammatory eye conditions, neuritis and acute sulphone sensitization.

In the authors' experience these conditions can be controlled and arrested by cortisone or corticotrophin. "Cortisone is put up in tablets of 5 and 25 mg., and dosage is 100 mg. on the first day (divided into three 8-hourly doses) reducing each day so long as the reaction is being controlled; e.g., 100 mg.—75 mg.—50 mg.—25 mg.—12.5 mg. Such a 5-day course will often prove adequate but can be repeated as required. Sulphone treatment must be continued throughout, but it may prove desirable to make a reduction in dosage." Also, alternatively, corticotrophin gel may be injected for 5 days in doses decreasing from 40 to 5 mgm. If the condition does not yield to either of these courses, then treatment must be continued for as long as is necessary, with the smallest effective dose of cortisone and continuation of the sulphone.

For allergic conditions of the eye, eye-drops of 1% hydrocortisone acetate or cortisone acetate are recommended, a 2½% ointment being used at night. Systemic treatment is seldom required.

For severe or persisting neuritis sulphone treatment should be stopped, and 1 to 2 ml. of a preparation of equal parts of 2% procaine and a suspension of hydrocortisone, 25 mgm. per ml., injected intraneurally. This may have to be supplemented by systemic cortisone or corticotrophin. If with this treatment progress is not satisfactory surgical treatment should be instituted. If caseation in the nerve is suspected hormone treatment should be avoided.

Ernest Muir

MONTESTRUC, E. L'hormone somatotrope hypophysaire dans le traitement des réactions lépreuses. [**The Pituitary Somatotrophic Hormone in the Treatment of Leprosy Reactions**] *Bull. Soc. Path. Exot.* 1956, July-Aug., v. 49, No. 4, 589-90.

The author has already reported spectacular results from the treatment of leprosy reactions with cortisone over long periods [this *Bulletin*, 1956,

v. 53, 604]. He considers, however, that cortisone treatment should be restricted to severe cases.

He has now tried the pituitary somatotrophic hormone on 6 patients with leprosy reaction, 4 of slight and 2 of medium intensity. They received 15 daily injections of 100 "rat-units" of the hormone. In those with weak reactions, suppression of the reaction was fairly rapid and occurred in 48 to 72 hours. In the moderate reactions the result was slower, and disappearance of the reaction took 5 and 7 days, respectively. The results were thus less striking than those obtained with cortisone, but the author points out that the somatotrophic hormone is itself claimed to have a protective action against the adrenal atrophy brought about by cortisone. Hence, it is suggested that in combining the well-tolerated somatotrophic hormone with cortisone in those cases of leprosy reaction requiring prolonged cortisone treatment, any undesirable effects of the cortisone might be counteracted.

H. J. O'D. Burke-Gaffney

FLOCH, H. Sur les particularités du problème de la lèpre chez l'enfant [Observations on Leprosy in Children] *Arch. Inst. Pasteur de la Guyane Française et de l'Inini*. Publication No. 403. 1956, Aug., 8 pp.

The question of leprosy control in French Guiana is discussed. Much emphasis is placed on the early diagnosis of the disease in schoolchildren by inspection of schools twice each year. All non-lepromatous children are sent to a special school where they get education, meals and treatment. Before the introduction of sulphones many of these children went on to develop the lepromatous type of leprosy, but since the use of sulphones this has never occurred. New-born children are removed from infectious mothers, and they are vaccinated with BCG, in the hope that a certain amount of resistance may be conferred in that way.

Ernest Muir

BOENJAMIN, R. **The Social Aspects of Leprosy.** *Internat. J. Leprosy*. New Orleans. 1956, Apr.-June, v. 24, No. 2, 182-8.

FLOCH, H. Antigènes de *M. leprae* et de *M. tuberculosis*. Modifications apportées aux propriétés antigéniques du B.C.G. par l'action de divers solvants. [Antigens from *Myco. leprae* and *Myco. tuberculosis*. Changes caused in the Antigenic Properties of BCG by the Action of Various Solvents] *Arch. Inst. Pasteur de la Guyane Française et de l'Inini*. Publication No. 398. 1956, June, 7 pp.

Killed emulsions of BCG and other mycobacteria differ from *Myco. leprae* in their antigenic power when injected intradermally. Is it

possible by extracting BCG with solvents to remove these antigenic qualities so that the remaining organisms resemble the leprosy bacillus in reaction produced in the lepromin? Samples of BCG were extracted with various solvents and suspended in phenolized normal saline. The solvents used were isobutyl alcohol, methyl alcohol, acetic acid, acetone, ether, benzene, ethyl acetate, ethyl alcohol, petroleum ether, and chloroform.

Out of 13 patients, 4 whose lepromin was negative gave positive reactions with BCG that had been extracted with isobutyl alcohol. Of 7 out of 13 patients, whose lepromin was negative, only 1 gave a positive reaction with BCG extracted from chloroform. With the other solvents the percentage of disagreement was between these 2 extremes in the order in which they are mentioned above. The nearest approach to agreement was with chloroform-extracted BCG, BCG extracted with petroleum ether being next in approximation.

Ernest Muir

NETO, A. V. R., AZULAY, R. D., E SILVA, C. O., & DE ANDRADE, L. M. C.

Verificação da ação do BCG em doentes de lepra em tratamento. Comprovação histopatológica das lepromina-reações. [**Verification of the Action of BCG in Leprosy Patients under Treatment. Histological Confirmation of the Lepromin Reactions**] *Rev. Brasileira Leprologia*. S. Paulo. 1956, Jan.-June, v. 24, Nos. 1/2, 48-55, 1 fig. English summary (7 lines).

Trials were made to obtain further evidence of the power of orally administered BCG to convert a negative into a positive lepromin reaction in patients suffering from lepromatous leprosy who had become bacteriologically negative, and also in patients with the uncharacteristic form of the disease. The lepromatous group consisted of 18 patients whose lepromin reaction had been negative. They were given 200 mgm. of BCG once a fortnight up to a total of 400 to 1,200 mgm., after which the lepromin reaction was tested.

In all cases the site of inoculation was biopsied whether there were macroscopic results or not. In 2 there was a macroscopic reaction and histologically tuberculoid structure. In 12 there were doubtful reactions macroscopically, and 3 of these showed tuberculoid granuloma; 2 out of the 3 also showed Virchow's cells. The remaining 4 were macroscopically and histologically negative. The uncharacteristic cases behaved in practically the same manner. 4 control cases in which no BCG was given sometimes showed doubtful or even positive results macroscopically, but in them there was no tuberculoid structure.

The authors consider that the macroscopic reading of the lepromin reaction should be supplemented by histological examination of the point of inoculation. They are continuing this experiment in a larger number of patients.

Ernest Muir

BECHELLI, L. M., SOUZA, R. de P., QUAGLIATO, R. & FERRAZ, N. de T. BCG por via oral e positivação remota do teste lepromínico em escolares sãos. [**The Conversion to Positive of the Lepromin Reaction (Remote Reading) in Healthy Schoolchildren after Oral Administration of BCG**] *Rev. Brasileira Leprologia*. S. Paulo. 1956, Jan.-June, v. 24, Nos. 1/2, 1-8. English summary.

Out of 650 healthy schoolchildren those with negative or doubtful lepromin reaction after 30 days were chosen and divided into 4 groups. Each of these groups was given, respectively, fresh BCG (0.2 gm. thrice at weekly intervals), BCG which had been kept at room temperature for a fortnight, BCG kill by heat, and a neutral suspension resembling BCG suspension in appearance. At a period of 75 days after the original lepromin injection the results were again read. It was found that of those with original negative reaction 72.97% had been converted to various degrees of positivity after receiving the fresh vaccine, 38.71 after the vaccine kept at room temperature, 35.48 after the killed vaccine, and 35.90 after the control. Of those with slightly positive (1-plus) original readings the following percentages of increase were recorded respectively in the 4 groups: 21.67, 19.23, 19.57, and 19.75.

It is difficult to understand why fresh BCG should render positive those originally negative but not intensify the readings in those already slightly positive (1-plus).
Ernest Muir

SOUZA, R. de P., BECHELLI, L. M., FERRAZ, N. de T. & QUAGLIATO, R. BCG vivo, de 15 dias e morto em escolares sãos e viragem ou intensificação da lepromino-reação. [**Lepromin Sensitivity Induced or strengthened by Oral Vaccination with Fresh BCG, Fifteen-Days-Old BCG, and Heat-Killed BCG, among Healthy Schoolchildren**] *Rev. Brasileira Leprologia*. S. Paulo. 1956, Jan.-June, v. 24, Nos. 1/2, 9-22, 1 graph. [42 refs.] English summary.

In a group of 37 healthy schoolchildren with negative or doubtful lepromin reactions the reaction was made positive in 86.49% after oral fresh BCG administration. In a similar group of 27 the conversion rate was 77.78% after 15-days-old BCG had been given orally. In a group of 29 the conversion rate was 68.97% after heat-killed BCG had similarly been given. In a control group of 35 the conversion rate was 80%. In similar groups in which the lepromin reaction was slightly positive (1-plus) the reaction was increased, after vaccinating with the three forms of BCG and the control, in the proportions of 58.06, 52.94, 41.18, and 49.25%, respectively. These children were in the 5-9 and 10-14 age-groups.

The authors are led to the conclusion that in these age-groups there frequently occurs a spontaneous "natural" change from a negative to a positive reaction to the lepromin test at a rate almost as high as that believed to be induced by oral BCG vaccination. They consider it

important, however, that the lepromin reaction should be checked in the 0-4 age-group, and BCG given if indicated.

[It is remarkable why conversion should have taken place in 80% of the 35 control children within a few weeks, and not in the 5 to 14 previous years of life, unless the conversion is connected with the effects of the original lepromin testing.]

Ernest Muir

LACOUR. **An Attempt to Control Leprosy by B.C.G. Vaccine in the Loyalty Islands. Second Report 1955 Campaign.** 13 mimeographed pp. [1956.] Nouméa, New Caledonia.

The first report [see this *Bulletin*, 1956, v. 53, 68] gave the geography and history of these islands, the known amount of leprosy, the general plans of the campaign, and the record of the preliminary lepromin and tuberculin examinations. The inhabitants are divided into 4 original groups: A, with tuberculin and lepromin reactions positive; B, with lepromin positive and tuberculin negative; C, with both tests negative; and D, with positive tuberculin and negative lepromin. From 90 to 95% of the inhabitants were examined, and all those found tuberculin-negative were vaccinated with BCG. The percentages in the 4 categories in 1954, before giving BCG, were: A, 46.8; B, 13.0; C, 27.3; and D, 12.9. In 1955, after administering BCG, they were: A, 86.2; B, 3.4; C, 0.8; and D, 9.6. At the time of the Report 90 to 95% of the inhabitants of the Loyalty Islands showed a positive reaction to tuberculin and lepromin. "The leprosy endemicity already carefully defined has been attentively re-examined and its evolution closely followed from the commencement of the campaign."

Ernest Muir

ELEK, S. D. & HILSON, G. R. F. **The Evolution of Lepromata in the Rat.** *J. Path. & Bact.* 1956, Oct., v. 72, No. 2, 427-37, 14 coloured figs. on 2 pls. [28 refs.]

As a preliminary to an attempt to cultivate *Myco. lepraemurium* *in vitro* the recorded 2 experiments were planned to discover the earliest acceptable proof of bacillary growth *in vivo*. Omental leproma was removed from a rat infected with the Wells strain 6 months earlier. This was minced in saline and the supernatant fluid diluted and standardized. With this 18 rats were injected intradermally, each rat receiving 0.04 ml. of the suspension into both flanks. One rat was killed immediately after the injection, and another the next day, the rest being killed at weekly intervals. Both injection sites were excised with a narrow margin of normal skin, and sectioned. In the second experiment the bacillary suspension was obtained from a subcutaneous nodule in a white mouse. After standardization the suspension was divided in two, half being killed by heat. A third bacillary suspension was prepared from an agar culture

of *Myco. phlei*. Three groups, each of 8 rats, were injected intraperitoneally with 0.5 ml. of suspension, the first group with living, the second with dead *Myco. lepraemurium*, and the third group with the suspension of *Myco. phlei*. The rats were killed at intervals similar to those in the first experiment, and the omentum was removed and fixed in Bouin's fluid and sectioned.

In the skin sections of the first experiment there were at first inflammatory, chiefly polymorphonuclear, cells, but by 7 days these had disappeared and were replaced by elongated macrophages containing large numbers of bacilli and giving the appearance of a leproma. Up to 4 or 5 weeks these bacillus-laden cells gradually disappeared. But at 6 weeks there was a change in the picture and a great increase in cellularity with follicles surrounded by lymphocytes. Some of the cells appeared to have digested their bacilli, while in others they had multiplied. By 8 weeks there were still more bacilli and the circumference of the lesion was spreading.

The chief lesson from the second experiment was that while the bacilli of the killed inoculum remained constant in number and size up to 16 weeks, those of the living inoculum diminished up to 4 weeks, after which they began to increase. Also from 3 to 6 weeks these bacilli increased in length, after which they diminished to the size of those in the killed inoculum by the 16th week.

"It is suggested that if cultivation of rat-leprosy bacilli in monocyte cultures is to be successful, maintenance of cultures for at least a similar period of time [6 to 8 weeks] will be necessary." *Ernest Muir*

HADLER, W. A. & ZITI, L. M. Algumas observações sobre o modo de ação do 4-4'-diaminodifenilsulfona na lepra murina. [**Some Observations on the Mode of Action of Diamino Diphenyl Sulphone in Rat Leprosy**] *Rev. Brasileira Leprologia*. S. Paulo. 1956, Jan.-June, v. 24, Nos. 1/2, 56-68, 1 chart. [13 refs.] English summary.

9 lots of rats were selected, each 20 in number and all 60 to 90 days old. 4 lots (1B, 2B, 3C and 3E) were treated as controls and were given no DDS. Three lots were given 0.2% of DDS in their food (*viz.*, 1A, 2A and 3A). Two lots were given 0.3% DDS in their food (*viz.*, 3B and 3D). All the rats were inoculated with rat leprosy bacilli intraperitoneally, as follows: 1A and 1B with bacilli taken from rat lesions; 2A with bacilli from 1A; 2B with bacilli from 1B; 3A, 3B and 3C with bacilli from 2A; 3D and 3E with bacilli from 2B. The results were based on the survival times which were found to be in inverse proportion to the intensity of infection.

There were significant differences between the lots, but they could be divided into 3 groups. The shortest survival time was in 3 of the controls: 2B, 3E and 1B, in that order. Next in shortness of survival came 3D, 3C and 1A. It is of interest that 3C is a control and was not

given DDS. The prolongation of the survival time of this control lot is imputed to the fact that the inoculated bacilli had lost their speed of growth by previous passage through a rat under treatment with DDS. The 3 longest surviving lots were 2A, 3A and 3B, in that order, the longest lived being 2A, indicating the combined effect of treatment and previous passage of the inoculum through a treated rat.

It is concluded that the treatment of rats inoculated with *Myco. leprae-murium* seems to make the development of the disease slower, but the principal action of the sulphone does not appear to be bacteriostatic "because the results are very late and arise without active participation of the host tissue cells". It is suggested that DDS produces an alteration of the vitality of *Myco. lepraemurium*. "In this way the preliminary treated bacilli become altered and when inoculated in rats produce a disease with slow development even without further treatment." On the other hand the results suggest "that during the chronic DDS treatment of murine leprosy no sulfone-resistant organisms appear". Ernest Muir

HELMINTHIASIS

In this section abstracts are arranged as far as possible in the following order:—TREMATODES (schistosomes, other flukes); CESTODES (Diphyllobothrium, Taenia, Echinococcus, other cestodes); NEMATODES (Hookworms, Ascaris, Filarial worms, Dracunculus, etc., Trichuris, Enterobius, Trichinella, etc.).

WATSON, J. M. **The Schistosomes and their Molluscan Vectors in Iraq.**

Reprinted from *Bull. College Arts & Sci., Baghdad*. 1956, June, v. 1, 1-11. [26 refs.]

This paper gives a brief account of the present state of knowledge concerning the schistosomes and their snail vectors in Iraq. *Schistosoma haematobium* is the only species infecting man and it is a serious cause of ill-health. *S. bovis* and *Ornithobilharzia turkestanicum* parasitize domestic animals, both infecting a wide range of hosts; the latter is confined to the swamp and rice-growing areas in the south but the former is widely distributed. *Bilharziella yokogawai* has been recovered once from the common teal, but it may be prevalent and the cause of human cercarial dermatitis.

Bulinus truncatus is the proved host of *S. haematobium*; its distribution and ecology in Iraq have been reported previously by the present author [see this *Bulletin*, 1949, v. 46, 554, 846; 1953, v. 50, 953 and others]. *Limnaca lagotis* is incriminated as the host of *O. turkestanicum*. It is widely distributed in stagnant or slow-running fairly permanent habitats, but the infection occurs only in the south. The intermediate host of *S. bovis* has not yet been proved; it is probably *B. truncatus*. The only planorbid snail is *Gyraulus ehrenbergi*. *S. mansoni* does not occur there

and *G. ehrenbergi* is nowhere regarded as a vector of it, but either this species or *L. lagoti* may be the intermediate host of *B. yokogawai*, the vector of which has not been proved.

Since the Schistosomatidae are essentially parasites of birds, Iraq presents an ideal centre for the study of parasites of this family because of its vast areas of snail-infested swamps and large population of indigenous and migrant birds.

T. H. Davey

WATSON, J. M. & NAJIM, A. T. **Studies on Bilharziasis in Iraq. Part**

XI. Observations on Schistosome Dermatitis. Reprinted from *J. Iraqi Med. Professions*. 1956, Mar., v. 4, No. 1, 4-10.

The presence of schistosome dermatitis in Iraq has already been noted [this *Bulletin*, 1951, v. 48, 170], though the identity of the causative cercariae has not so far been established. Two patients suffering from the condition have now been studied in detail; a search has been made for cercariae, their snail vectors, and their definitive hosts.

The 2 patients studied were troubled by severe pruritus some 2 hours after entering water, and this lasted for 5-6 days. Within 3 days there was an eosinophilia of 8-10%. Very numerous discrete red papules developed on the legs. Though schistosome-free at the time of the exposure, both men developed severe signs of schistosomiasis within 3 months.

Collections of fresh-water snails were examined for cercarial infections. None but *Bulinus truncatus* was found to be infected, and this snail harboured only the cercariae of *Schistosoma haematobium*. Birds were shot and examined for schistosomes, but none were found to be infected. Nevertheless certain birds (teal) recognized as hosts of species of *Bilharziella* are present in the country, and *Schistosoma turkestanicum* also is found there; the cercariae of these worms may occasionally be the cause of a true cercarial dermatitis.

A. R. D. Adams

SENF, A. W. & WELLER, T. H. **Growth and Regeneration of *Schistosoma mansoni* in vitro.** *Proc. Soc. Exper. Biol. & Med.* 1956, Oct., v. 93, No. 1, 16-19, 3 figs. [10 refs.]

The survival and growth of schistosomulae were studied *in vitro*. The culture fluid consisted of bovine amniotic fluid, saline, inactivated horse serum, beef embryo extract with penicillin, streptomycin and phenol red added. The pH was adjusted to 7.4 by passing CO₂ in air, when necessary. The schistosomulae were obtained by aseptic techniques after percutaneous or intraperitoneal infection. At intervals after intraperitoneal infection the peritoneal cavity was flushed with culture medium to obtain the schistosomulae. Mice infected percutaneously were given heparin intraperitoneally a few minutes before they were killed; the portal vessels and liver were teased in culture medium to extract the schistosomulae. In

some instances washed mouse red cells were added to the culture fluid. Cultures were maintained in upright tubes and at 2- to 4-day intervals the culture medium was replaced. In order to measure any change in size, 3 to 6 camera lucida drawings of the schistosomulae were made at each examination.

A total of 78 schistosomulae were cultured and observed. The initial age of the worms varied and so did the period of observation. Schistosomulae 6 to 10 days old survived for approximately 3 to 11 days and the older the parasites were initially, the longer they lived *in vitro*. Those introduced to culture medium at 16 days old survived from 17 days to more than 35 days, while immature schistosomes taken 30 days after infection lived *in vitro* for many weeks on culture fluid supplemented with red cells. It was believed that the introduction of red cells to cultures started on the 16th day produced greater activity and slightly greater longevity. In cultures set up with immature worms 30 days old, the addition of red cells was followed by accelerated somatic movement and peristaltic activity. In young worms with caeca almost devoid of black pigment, the addition of erythrocytes to the medium resulted in considerable accumulation of black material in 8 to 24 hours. Usually, such pigment disappeared within 48 hours of withdrawal of red cells from the cultures. Worms of all ages showed evidence of growth.

Damaged worms showed an ability to regenerate their tissues. In four instances a missing posterior portion was regenerated *in vitro* within 10 to 20 days. Two schistosomes lacking the anterior portion were observed for 23 days and showed no signs of diminished activity. *O. D. Standen*

LEWERT, R. M. & LEE, Chang-Ling. **Quantitative Studies of the Collagenase-Like Enzymes of Cercariae of *Schistosoma mansoni* and the Larvae of *Strongyloides ratti*.** *J. Infect. Dis.* 1956, July-Aug., v. 99, No. 1, 1-14, 5 figs. [10 refs.]

This paper records the results obtained by a continuation of the investigations described in 1956 [this *Bulletin*, 1955, v. 52, 374].

The authors' summary is as follows:—

“The cercariae of *Schistosoma mansoni* and the filariform larvae of *S. ratti* produce enzymes believed to be associated with their ability to penetrate the skin of their definitive hosts and to migrate subsequently through the tissues. Collagenase-like, proteolytic enzymes are found in each and their activities have been characterized through the use of quantitative measurements and by comparison with a bacterial collagenase and trypsin. Activity has been measured primarily as dye released from azo dye-coupled, collagen-containing, substrates and also as hydroxyproline released as amino acid or in polypeptides from collagen substrates. Various qualitative tests of activity including histochemical methods demonstrating action on native substrates *in vivo* have also been performed.

"The activity of the helminth-derived enzymes is directly proportional to the number of organisms present in the test systems used or to the dry weight of organisms from which the aliquot of enzyme has been extracted. This activity increases with time of incubation at 37°C. and is destroyed by heating to 60°C. The optimal pH of the enzyme of *S. mansoni* in phosphate buffer is near 7.5 while that of *Strongyloides ratti* is in the vicinity of 7.0.

"The enzymes of the two helminths differ in their degree of sensitivity to various of the metal ions tested. Both helminth enzymes are inhibited by Hg^{++} and Cu^{++} and slightly activated by Ca^{++} and Mg^{++} . Agents binding sulphhydryl groups inhibit the activity of the enzyme derived from *S. mansoni* but are with little effect on that of *S. ratti*. The latter is more sensitive to chelating agents and sulphhydryl-containing compounds than is the cercarial enzyme. In contrast to trypsin, both helminth enzymes are active on cartilage and neither is affected by the presence of trypsin inhibitors. When compared to bacterial collagenase, the activity of the helminth enzymes on native collagen in vitro is slight although in vivo activity against collagen-containing tissues of the host is marked.

"Various substances active in vitro in inhibiting the helminth enzymes have been tested for their ability to inhibit penetration of the skin by living larvae. One of these, a chelating agent, was capable of inhibiting penetration without otherwise causing obvious damage to the infecting organisms."

[This is an important and interesting paper which does not lend itself to further summarization. It should be read in the original by those interested in the mechanisms by which helminth larvae invade the skin of vertebrates, and the possible association of one or more of these various methods of invasion with the subsequent development of resistance or immunity by the mammalian host.]

R. M. Gordon

PARAENSE, W. L. & DESLANDES, N. **Diagnostic Characters of the Brazilian Species of "Australorbis" (Pulmonata, Planorbidae).** Reprinted from *Rev. Brasileira Biologia*. 1956, Oct., v. 16, No. 3, 281-6, 5 figs. [18 refs.]

[See this *Bulletin*, 1956, v. 53, 208 bis, 610, 1132; 1957, v. 54, 60 bis.]

PARODI, PROUST & TALARMIN. Action des désoxybenzoïnes (1183 TH) sur la bilharziose intestinale. [**Action of Desoxybenzoins (1183 TH) in Intestinal Schistosomiasis**] *Bull. Soc. Path. Exot.* 1956, July-Aug., v. 49, No. 4, 654-7.

Following a report [this *Bulletin*, 1954, v. 51, 1073] on the anthelmintic activity of basic desoxybenzoins the authors have used one of the most active of them (1183 TH) for the treatment of old-standing cases of

Schistosoma mansoni infection, which were remote from the risk of re-exposure to infection. 18 such patients were treated for 8 days and then given a second similar course after an interval [? a week]. Some patients were given a third course of treatment 15 days later.

15 of the patients were considered to be cured of their infections after 3 months' post-treatment observation.

The drug was given orally and it caused negligible side-effects.

A. R. D. Adams

MOORE, D. V. & SANDGROUND, J. H. **The Relative Egg producing Capacity of *Schistosoma mansoni* and *Schistosoma japonicum*.** *Amer. J. Trop. Med. & Hyg.* 1956, Sept., v. 5, No. 5, 831-40.

A method is described for counting the egg output of *Schistosoma mansoni* and *S. japonicum* in experimentally infected hamsters. The hamsters were infected percutaneously by exposure to 75 or 150 cercariae of *S. mansoni* or 70-80 cercariae of *S. japonicum*. Faeces were collected in physiological saline in trays beneath individual wire mesh cages and total egg counts were made every 24 hours. Such faecal examinations were started 5 days before eggs would normally be expected in the faeces [35-40 days after infection?]. The number of days over which faecal collections were made ranged from 16 to 21 and the animals were killed at the end of this period. Egg counts were facilitated by a modification in the diet of the hamsters to eliminate coarse vegetable debris, large particles and hair were removed by sieving and the eggs were concentrated by sedimentation and subsequent centrifugation. The packed sediment was diluted with 0.01% eosin saline solution to 3.75 ml. or 7.5 ml. according to required dilution. During agitation of the specimen by air bubbling, 4 samples of 0.075 ml. were withdrawn by Stoll pipette and egg counts made. The average of these counts was multiplied by the sampling factor to obtain the 24-hour egg output. At autopsy the number of worms present was counted and the viscera were then removed; the large and small intestines were washed out and egg-counts made of the contents. The eggs present in the tissues of the liver, large and small intestine, lungs, spleen and mesenteries with associated lymph nodes and pancreas were counted after a digestion procedure with a pepsin-HCl medium.

The day on which egg-laying commenced was taken, arbitrarily, to be the day on which eggs first appeared in the faeces. [To allow for the time required for eggs to pass through the wall of the intestine and to become mature, egg-laying may commence 6-10 days earlier than this and, if so, would have a marked effect upon the estimated daily output of eggs per female as calculated from the number of days under observation.] From the total egg-counts and the number of mature female worms recovered at autopsy it was estimated that each female *S. mansoni* produced about 300 eggs per day whereas each female *S.*

japonicum produced 3,500 eggs per day. Certain other differences between the species were observed. Whereas with *S. mansoni* 22% of all eggs appeared in the faeces, 18% remained in the walls of the large intestine, 32% in the walls of the small intestine and 26% in the liver, the comparable figures for *S. japonicum* were 16%, 50%, 10% and 23%, respectively. Only 1 to 2% were found in the mesenteries in each species, and the number of eggs in spleen and lungs was insignificant. The species difference in the proportion of eggs found in the walls of the large and small intestine is believed to be due to a predilection by *S. japonicum* for the vessels draining the large intestine.

[The authors' summary gives the proportion of eggs found in the mesenteries for *S. japonicum* infection as 17%. This is in error; the text and table give 1%.] [See also this *Bulletin*, 1935, v. 32, 625.]

O. D. Standen

SAWADA, T., HARA, K., TAKAGI, K., NAGAZAWA, Y. & OKA, S. **Cytochemical Studies on the Hepatic Tissue of Mice following Infections with *Schistosoma japonicum*.** *Amer. J. Trop. Med. & Hyg.* 1956, Sept., v. 5, No. 5, 847-59, 5 figs. (1 coloured). [32 refs.]

The authors state that although numerous histopathological studies on liver damage following infections with *Schistosoma japonicum* have been reported in the literature, no reports have so far been made regarding cytological or cytochemical changes. They have therefore carried out cytochemical studies on the hepatic cells, the connective tissue, and the haemosiderin-like pigment in Kupffer cells of the liver in 15 mature mice of both sexes infected by the subcutaneous injection of *S. japonicum* cercariae. Each mouse received 80 cercariae and the animals were sacrificed in groups of 5 at intervals of 7, 8 and 9 weeks after infection, and their livers were subjected to various histochemical tests, the results of which are described fully in the text.

The authors' summary is as follows:—

“Cytochemical studies on the hepatic lesions of DD mice infected with *Schistosoma japonicum* gave additional evidences of hepatic damage, in which significant findings were a marked increase of glycogen and fat, and a decrease of RNA in the cytoplasm of hepatic cells together with the frequent occurrence of nuclear karyorrhexis. In addition, there was the excessive accumulation of acid mucopolysaccharides (hyaluronic acid type) in the connective tissue of schistosomal granuloma and in the walls of portal vessels. The possible effect of these substances was considered to be the induction of the circulation disturbance in parenchymal tissues rather than the toxic effect of schistosomal worms or eggs. The flame-like, eosinophilic deposits about the schistosomal eggs were composed of polysaccharides other than glycogen and closely related to the substance of the egg shell. The hemosiderin-like pigment deposited in the enlarged, Kupffer cells showed a marked affinity with silver and the lack of evidence

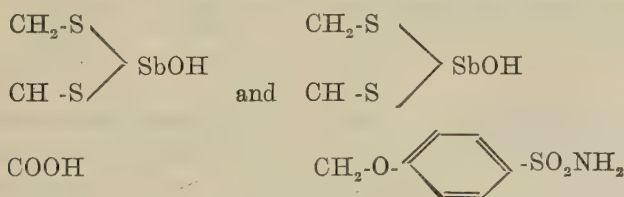
for the presence of ferric, ferrous and masked iron. Only one of a number of dissolving agents for the pigment was 40 per cent. alcohol sulfate. Considering the results of many cytochemical tests, the best possible suggestion for its nature was its analogy to melanine rather than to products of hemosiderin decomposition."

R. B. Griffiths

TSEN, Yea-Lin, CHU, Chiao-Chen, CHIH, Chih-Chiang, LIANG, Yu-I & TING, Kuang-Sheng. [**Studies on Antibilharzial Drugs. I. Experimental Therapy per os of 8 New Compounds with Dithia-Dihydrostibiol Structure in Mice**] Reprinted from *Acta Physiologica Sinica*. 1956, v. 20, No. 3, 125-32. [13 refs.] [In Chinese.]

The English summary appended to the paper is as follows:—

"A series of 8 new compounds with the dithia-dihydrostibiol structure has been compared for the therapeutic activities against schistosomiasis japonica in white mice. Each drug, thoroughly mixed with the finely powdered food, was fed to healthy mice for 14 days, and the LD₁₀ and LD₅₀ were evaluated. At the dosages of LD₁₀ and LD₅₀, each drug was fed to treat diseased mice (beginning on the 36th day after percutaneous infection on abdomen with 40 cercariae per mouse) for 14 days. After a holding period of another 14 days mice were killed. Both portal system and liver were carefully scrutinized for worms. Basing on the average number of worms remained in each mouse, the therapeutic effects of



out of the 8 compounds were better than that of tartar emetic administered orally."

LIANG, Yu-I, CHU, Chiao-Chen, CHIH, Chih-Chiang, TSEN, Yea-Lin & TING, Kuang-Sheng. [**Studies on Antibilharzial Drugs. II. Effect of 5 Drugs on the Toxicity and Therapeutic Activity of Tartar Emetic**] Reprinted from *Acta Physiologica Sinica*. 1956, v. 20, No. 3, 133-43, 1 fig. [33 refs.] [In Chinese.]

The English summary appended to the paper is as follows:—

"Acute toxicity experiment consisted of one single intraperitoneal injection, while subacute toxicity experiment consisted of one injection daily for 14 days, of tartar emetic and a subsequent 3-day holding period. The mortality of mice from tartar emetic was observed after concomitant injections of 5 testing drugs (procaine-HCl, sodium phenyl acetate, sodium

$\alpha\alpha'$ -dimercaptoadipate, sodium mercaptosuccinate and sodium thiosulfate). The effective detoxicants were mixed up with tartar emetic and then injected intraperitoneally, once daily for 14 days, to infected mice. The mice were killed after a holding period of another 14 days. Basing on the average number of worms remaining in each mouse, the effects of detoxicants on the antibilharzial activity of tartar emetic were compared. The results were as follows:

"(1) In mice the acute and subacute LD₅₀ after intraperitoneal injection of tartar emetic were found to be 38 and 35 mg/kg/day respectively.

"(2) The mortality of mice from tartar emetic could be markedly reduced by simultaneous injection of procaine, sodium phenyl acetate, sodium $\alpha\alpha'$ -dimercaptoadipate and sodium mercaptosuccinate, while sodium thiosulfate did not afford any protection.

"(3) Procaine, sodium phenyl acetate, sodium $\alpha\alpha'$ -dimercaptoadipate and sodium mercaptosuccinate did not decrease the therapeutic activity of tartar emetic, and, moreover, procaine could significantly augment its therapeutic activity against schistosomiasis japonica."

CHU, Chiao-Chen, CHIH, Chih-Chiang, TSEN, Yea-Lin, LIANG, Yu-I & TING, Kuang-Sheng. [**Studies on Antibilharzial Drugs. III. Investigations on some Routine Procedures in Experimental Therapy**] Reprinted from *Acta Physiologica Sinica*. 1956, v. 20, No. 3, 144-50, 1 chart. [16 refs.] [In Chinese.]

The English summary appended to the paper is as follows:—

"(1) White mice were exposed to 40 cercariae of *Schistosoma japonicum* on the abdomen for 3, 5, 10, 15 and 20 minutes. Five weeks later, mice were killed and searched for worms. The percentage of worms recovered in the 5-minute group was found to be low (33%), whereas the differences between those in the 10-minute (45%), 15-minute (51%) and 20-minute (54%) groups were non-significant.

"(2) Infected mice were treated with tartar emetic given by mouth for 2 weeks. After a holding period of 1, 2, 3 or 4 weeks, mice were sacrificed. The differences between the number of worms remaining in the 4 groups of mice were non-significant. Therefore, one week may be adopted as the holding period in the screening test for antimonials.

"(3) In the control group and in the treated group with tartar emetic 270 mg/kg/day, there was no significant difference between the number of worms remaining in male and in female mice. But in the treated group with tartar emetic 170 mg/kg/day, the number of worms remaining in female mice was less than that in male mice. Hence it is advisable to use equal number of both sexes of mice in experimental therapy.

"(4) After the treatment with tartar emetic, mice were divided into 2 grades according to the body weights. The number of worms remaining in mice of the 2 grades revealed a significant difference only in the group with holding period of 3 weeks, but not in other groups."

HUNTER, G. W., RITCHIE, L. S., LIN, S., PAN, C. & TANABE, H.
Immunological Studies. I. Experiments with Bird and Human Schistosomes in Small Mammals. *Exper. Parasit.* New York. 1956, Nov., v. 5, No. 6, 551-9. [31 refs.]

"Mice, hamsters, and rabbits were tested against cercariae of *Gigantobilharzia sturniae* and *Schistosoma japonicum* by two exposures within 14 days to the same parasite followed in about a month by a recall or challenging exposure to the same or alternate species. In each case the skin was examined macroscopically for evidence of sensitization and biopsies taken regularly at typical exposure and non-exposed sites were examined microscopically.

"Repeated exposure to the bird schistosome cercariae, *G. sturniae*, produced an increase in sensitivity, while *S. japonicum* did not. Cercariae of *G. sturniae* followed by those of *S. japonicum* gave no evidence of dermal sensitization or resistance. However, the reciprocal cross using cercariae of *S. japonicum* followed by those of *G. sturniae* produced less histologic reaction in the tissues as compared with the experiment in which only the cercariae of *G. sturniae* were used. Fewer parasites were seen in the sections of biopsies. These results are suggestive of the existence of some sort of immunologic response, the mechanism of which is not clearly understood."

YAMAGUCHI, T., NISHIMOTO, M. & MURAKAMI, K. [*Parafossarulus manchouricus japonicus* (Pilsbry). **First Record in Shikoku Island**] *Shikoku Acta Med.* 1956, Oct., v. 9, No. 4, 50-51, 2 figs. [In Japanese.]

The English summary appended to the paper is as follows:—

"*Parafossarulus manchouricus japonicus* (P.) is the first intermediate host of *Clonorchis sinensis*. In spite of its medical importance, this snail in Shikoku Island has not been discovered.

"In March 1956, the authors collected this snail from Ohtsu district of Naruto City, for the first time discovery in Shikoku Island.

"The length of shell varies from 8.35 to 11.85 mm and the width of shell from 5.3 to 6.9 mm. The length and width of aperture 4.8 mm and 3.9 mm respectively. The ratio of width and length of shell are 0.594-0.598, the ratio of width and length of aperture are 0.796-0.799, on average."

BERTRAND, J. L. & FAURE, H. Une épidémie localisée de distomatose hépatique et deux cas de distomatose hépatique à manifestations sous-cutanées. [**A Localized Outbreak of Hepatic Fascioliasis and Two Cases of Hepatic Fascioliasis with Subcutaneous Lesions**] *Maroc. Méd.* 1956, Sept., v. 35, No. 376, 902-12.

The authors note that *Fasciola hepatica* is a rare parasite in man but infection is liable to result if watercress is eaten which has not been

grown under supervision. The incidence in Morocco is difficult to establish but there have been a few previous reports. The authors observed 9 cases which occurred among a small group of workers camping at Ahermoumou. Only 1, who did not eat watercress, remained well. Those infected gradually developed prolonged fever, with shivering and sweating, headache, joint pains, pain in the epigastrium and right hypochondrium, anorexia and lassitude. In diagnosis the authors note a suggestive history, a considerable eosinophilia (40–61%) accompanied by an enlarged tender liver and sometimes a palpable spleen. Ova are not found in the stools or on duodenal lavage until 3–4 months after infection. An intradermal reaction with an antigen prepared from distomes by the technique of Lavier and Stéphanopoulo is considered to give reliable results during the early septicaemic stage of the disease but it is less reliable after the infection is established in the biliary tract. Liver biopsy shows inflammatory and necrotic lesions. The serum shows a great increase of gamma globulin.

In addition the authors report 2 cases in which fatigue and prolonged fever were associated with the appearance of subcutaneous swellings which felt hot and were irritating but not painful. The intradermal distome antigen produced a violent reaction in each patient. Although *F. hepatica* ova were not identified the authors conclude that these lesions were allergic reactions to the migration of this distome and treated the patients with apparent success by emetine and Notézine [diethylcarbamazine]. The lack of pronounced eosinophilia in these cases is attributed to these lesions occurring at a late stage of infection. [See also this *Bulletin*, 1953, v. 50, 43.]

The authors discuss the differential diagnosis of the septicaemic stage, with fever, eosinophilia and an enlarged tender liver, but do not mention schistosomiasis.

Frederick J. Wright

LOUW, J. H. & WILKIE, W. **Infestation by *Fasciola hepatica*.** *South African Med. J.* 1956, Dec. 1, v. 30, No. 48, 1157–65, 6 figs. [21 refs.]

The authors, from Cape Town, give a very full account of the biology of *Fasciola hepatica*, its distribution, pathological effects, clinical forms of the infection, diagnostic methods and treatment. They note that infection of animals is fairly general in the summer-rainfall areas of South Africa, less common in the winter-rainfall areas (Cape Western Province) and rare in the dry areas (South-West Africa). Figures from municipal abattoirs in different South African cities show incidences of up to 10% in sheep and cattle. They then describe two cases in full. The first was that of a European boy of 3 years, who had lived in the Belgian Congo for 15 months, and had a 9-month history of recurrent pyrexia, abdominal pain, anaemia, leucocytosis, eosinophilia (17 to 32%), enlarged liver and melaena. On 2 occasions ova of *F. hepatica* were found in the stools. Blood transfusion and 10 days' treatment with emetine stopped the

melaena and the ova disappeared from the stools, but no dramatic improvement followed and the episodes recurred for 3-4 days at a time over a period of 6 weeks and further transfusions were necessary. A laparotomy then revealed necrotic "abscesses" in the liver, a thickened bile-duct and an inflamed gallbladder: localized foci of pseudotubercles around the cystic duct contained ova of *F. hepatica*. After a brief improvement, the febrile episodes, melaena and jaundice recurred, together with haemorrhage through the T-tube which had been inserted in the common bile-duct. More transfusions were made, and more relapses occurred. A second laparotomy some 2 months after the cholecystectomy did not reveal the source of the bleeding: the child by now had had 15 transfusions (about 6 litres) and was *in extremis*. After 4 months in hospital he was given a second course of emetine, which was followed by immediate improvement, cessation of bleeding and rapid recovery, which has been maintained 3 years later.

The second case was that of a man of 45, with a history suggesting a stone in the common bile-duct. At operation 4 *F. hepatica* were found in the common bile-duct. Recovery took place after 2 courses of emetine.

It is suggested that human infections in South Africa may not be as rare as had been believed.

H. J. O'D. Burke-Gaffney

ATIAS, A. & PESSE, Norma. Distomatosis hepática en la infancia.

[**Infantile Hepatic Fascioliasis**] *Bol. Chileno de Parasit.* 1956, Apr.-June, v. 11, No. 2, 36-8. [16 refs.]

The English summary appended to the paper is as follows:—

"Infection with *Fasciola hepatica* is very uncommon in children. The authors describe two cases in which the parasites were found in two sisters, aged 7 and 9 years respectively. One of the patients had fever, abdominal pain, loss of weight, hepatomegaly and blood hypereosinophilia varying from 15 to 63%. *Fasciola hepatica* eggs were found in the stools after repeated examinations. The patient developed jaundice with increase of direct bilirubinemia, high phosphatase titers (64 U.B.) and positive flocculation. All the symptoms and signs disappeared after emetine treatment and the parasite eggs were no longer found in the stools. The second case showed no symptomatology but ova of *Fasciola hepatica* were also found in the stools, and they disappeared after emetine treatment. Both sisters used to eat watercress.

"The observations stress the necessity to investigate the whole family group when one case of *Fasciola hepatica* infection is confirmed.

"The more important clinical and pathological aspects of human fascioliasis are briefly described."

DI BELLO, R. Pericarditis hidática aguda. Nuevo trabajo de conjunto basado en 19 observaciones. [**Acute Hydatid Pericarditis**] *An. Facul. de Med. Montevideo.* 1956, Sept.-Oct., v. 41, No. 5, 151-8. [36 refs.] English summary.

MANKAU, S. K. **Studies on *Echinococcus alveolaris* (Klemm, 1883), from St. Lawrence Island, Alaska. III. The Histopathology caused by the Infection of *E. alveolaris* in White Mice.** *Amer. J. Trop. Med. & Hyg.* 1956, Sept., v. 5, No. 5, 872-80, 9 figs.

The author refers to the belief of some workers that the alveolar hydatid cyst is only a phase of *Echinococcus granulosus*, whereas others regard it as the larval stage of a distinct species, *E. alveolaris*. In this study he uses the name *E. alveolaris* for certain tapeworms (recovered from naturally infected foxes in Alaska), whose eggs when fed to white mice developed into the alveolar type of cyst. The pathological changes that occurred in the viscera of the experimental mice during the growth of the cysts are recorded. Although the lung, kidney, spleen, pancreas and alimentary canal were affected in certain instances, the liver was found to be the primary site of infection.

The changes in the host's tissues were found to comprise acute inflammation initially, followed by perivascular infiltration with mononuclear cells and marked local eosinophilia. In the liver it was observed that, because of the growing cysts' successive exogenous and endogenous budding, there was extensive invasion by the parasite, the entire tissue of the infected organ eventually appearing as "a mesh of fibrotic adventitia". The author concludes his summary by stating: "The chief characteristic of the larval stage of *E. alveolaris* is the type of lesion, which behaves very much like an infiltrating neoplasm".

R. B. Griffiths

TAGLE, I., RIVERA, G. & NEGhme, A. Ensayos de infección experimental de *Octodon degus degus*, Molina, con *Echinococcus granulosus*. [Experimental Trials of *Echinococcus granulosus* Infection in *Octodon degus degus* Molina] *Bol. Chileno de Parasit.* 1956, Apr.-June, v. 11, No. 2, 33-4, 1 fig.

The English summary appended to the paper is as follows:—

"Work on the experimental infection of the autochthonous Chilean rodent, *Octodon d. degus*, Molina, by *Echinococcus granulosus* is described. Of fourteen animals infected orally with *E. granulosus* proglottids, five showed the development of the hydatid or larval stage."

FAIN, A. ***Cocnurus* of *Taenia brauni* Setti Parasitic in Man and Animals from the Belgian Congo and Ruanda-Urundi.** [Correspondence.] *Nature.* 1956, Dec. 15, v. 178, 1353.

The author has worked out, for the first time, the life history of *Taenia brauni* Setti (1897), the adult of which is common in the intestines of dogs and jackals in the Ruanda-Urundi and Ituri regions of the Belgian Congo, where it is, together with *Taenia hydatigena*, the only taenioid species found in dogs.

The larval phase is a coenurus parasitic, in Ruanda-Urundi, in numerous wild rodents (*Lemniscomys striatus*, *Rattus r. rattus*, *Tachyoryctes ruandae*, *Otomys irroratus vulcanius*, *Dendromus pumilio lineatus* and *Grammomys surdaster*): the author also found the coenuri in white mice fed by him with proglottids from parasitized dogs. In some areas 20% of the rats were infected. He also obtained the adult worm by feeding young, non-infected dogs with fragments of a coenurus collected from naturally infected wild rodents.

In wild rodents the coenurus is most often under the skin, but it also occurs in the pleural and abdominal cavities and, in 3 *Rattus r. rattus* near Astrida, was found in different parts of the brain, 2 of these rats also having coenuri elsewhere in their bodies. The coenurus was also found in the brain of a monkey (*Cercopithecus mitis doggetti*). The brain of the monkey, also from near Astrida, contained a globular coenurus 2 cm. in diameter in the parietal lobe and 2 other coenuri, one in the apex of the heart and the other near the parotid gland. Between 1948 and 1956 the author has observed one globular or elongated coenurus, varying in size from that of an almond to that of a large plum, in each of 8 children (7 aged 11 months to 5 years and 1 aged 14). In 4 children the coenurus was found "along the ribs" and in 4 "elsewhere on the trunk".

The author thinks that the coenurus found by TARAMELLI and DUBOIS [this *Bulletin*, 1932, v. 29, 54] was that of *T. brauni*; and he says that it is possible that the 4 cases of cerebral coenuriasis discovered in South Africa in recent years and attributed to *T. multiceps* [*ibid.*, 1952, v. 49, 419] could also have been due to coenuri of *T. brauni*. This coenurus is less specific in its "choice" of locations in the host than are the coenuri of *T. serialis*, which occur under the skin, and those of *T. multiceps*, which occur in the brain.

G. Lapage

BURKS, J. W., Jr. & KINGERY, F. A. J. **Treatment of Creeping Eruption with Chloroquine Diphosphate: a Preliminary Report.** *Southern Med. J.* 1956, Nov., v. 49, No. 11, 1290-92.

Multiple creeping eruptions due to *Ancylostoma braziliense* are becoming increasingly common in the south-eastern United States. Current methods of treatment being unsatisfactory, the authors experimented with oral chloroquine diphosphate in doses for adults of 0.25 to 0.5 gm. of the salt [150-300 mgm. base] twice daily. Within 2 weeks 10 of 12 patients treated appeared to be cured. The duration of symptoms before treatment varied from 4 days to 4 weeks and untreated children in the same locality continued to have symptoms for long periods. The authors report that further investigations are in progress.

[It is to be hoped that in this area, where the infection is unusually common, a strictly controlled experiment will be carried out, avoiding, if possible, the possibility of re-infections. A critical evaluation of other

methods of treatment by LOEWENTHAL (this *Bulletin*, 1955, v. 52, 1001) threw doubt on their efficacy.] *Frederick J. Wright*

CARNEIRO, J. F. Síndrome de Löffler recidivante e aneosinofílica num caso de estrogiloidose. [**Relapsing Loeffler Syndrome without Eosinophilia in a Case of Strongyloides Infection**] *Med. Cirurg. Farmacia*. 1956, May, No. 241, 213-17, 6 figs.

KANT, L., SEN, S. K. & PURI, B. S. **Filariasis in Patna (Bihar).**
Part I. *Indian J. Malariology*. 1956, Sept., v. 10, No. 3, 199-217,
1 map & 7 graphs.

This paper reports some of the results of a survey of the incidence, types and distribution of filariasis in the eastern part of Patna, Bihar, India. Blood smears were collected between 8.30 p.m. and midnight from 9,485 persons representing some 8.3% of the population. Only *Wuchereria bancrofti* was found. Signs of filariasis were noted in 30.1% of those examined and 18.7% showed microfilariae. The youngest age of infection was 2 years and the youngest person showing filarial disease was 4 years. Microfilariae were found in 20% of persons with filarial disease and 18.7% of those without. Tables show the incidence of infection and of disease in various age-groups. Filariasis incidence was low up to the age of 10 and then increased steadily until the age of 50 when it declined, while the infection rate rose steadily from the age of 2 until 30 and then tended to remain steady. Infection of males was somewhat higher than in females but not significantly so, whereas disease was significantly more often recorded in males, possibly because women were reluctant to permit clinical examination.

Of the 9 species of mosquitoes collected and dissected, only *Culex fatigans* proved to be a vector, showing an infection rate of 11.9%. [See also this *Bulletin*, 1929, v. 26, 544.] *T. H. Davey*

JASWANT SINGH, RAGHAVAN, N. G. S. & KRISHNASWAMI, A. K. **Filariasis in Travancore-Cochin State. I. Ernakulam and Mattancherri.**
Indian J. Malariology. 1956, Sept., v. 10, No. 3, 219-38, 4 maps & 8 graphs.

The findings of the first filariasis survey in Ernakulam and Mattancherri are reported here. Blood smears from random samples of the populations were taken between 8 p.m. and midnight.

In Ernakulam 7,328 persons (11.6% of the population) were examined; 7.6% harboured microfilariae and 3.5% showed filarial disease. The endemicity rate was 10.6%. In Mattancherri only 4,017 persons (6.9% of the population) cooperated in the survey; the infection rate was 14.7%

and filarial disease was present in 7.6%. The endemicity rate was 21.7%. The infection rate was low in children but rose rapidly to 15% at 10 years of age in Mattancherri and to 10% at 20 years in Ernakulam, after which it remained fairly constant. Filarial disease showed a progressive rise with advancing age.

Both *Wuchereria bancrofti* and *W. malayi* were encountered; in Ernakulam the former was found alone in 91.6% of infections, the latter in 1.6%, while mixed infections occurred in 6.8%: in Mattancherri the figures were 90.3%, 7.6% and 2.1%. *W. malayi* infections occurred in the peripheral parts of the towns where conditions favoured breeding of *Mansonioides*. Only 3 of the 14 species of mosquitoes collected were found to carry filariae, namely *Culex fatigans*, *Mansonioides uniformis* and *M. annulifera*.

T. H. Davey

RAGHAVAN, N. G. S. **Filaria transmitted by Anophelines.** *Bull. Nat. Soc. India for Malaria & other Mosquito-Borne Dis.* 1956, Sept., v. 4, No. 5, 163-7. [Numerous refs.]

The author, from the Malaria Institute of India, has searched available records of anopheline mosquitoes found to be hospitable for the development of *Wuchereria* infections in nature and in the laboratory. From these he has compiled a useful list of over 70 entries in which the geographical location, anopheline species and reference are given.

Among a few general observations he notes that in Mwanza, on Lake Victoria, East Africa, *Anopheles gambiae* was found infected with *W. bancrofti*, but *Culex fatigans* was not, nor did it develop experimental infection [this *Bulletin*, 1953, v. 50, 45]. This seems to be the only case in which *C. fatigans* was noted to be neither a primary nor secondary vector of the periodic *W. bancrofti*.

There are a few references to animal filarial infections being transmitted by anophelines.

In the author's list, a number of instances are shown in which a species of anopheline carried both filarial and plasmodial infections.

H. J. O'D. Burke-Gaffney

BONNE-WEPSTER, J. ***Culex bitaeniorhynchus* as Vector of *Wuchereria bancrofti* in New-Guinea.** *Documenta Med. Geograph. et Trop.* Amsterdam. 1956, Dec., v. 8, No. 4, 375-9. [23 refs.]

The author discusses briefly morphological variation in adults of *Culex bitaeniorhynchus* and the considerable range of breeding places observed by herself and others and suggests that the variability is indicative of a species-complex. Particular interest attaches to the very unusual fact that large numbers of *C. bitaeniorhynchus* were found resting indoors and feeding on man in the Papuan town of Negeri Besar in New Guinea. Many of the population of about 1,000 people show microfilariae and

elephantiasis due, almost certainly, to *Wuchereria bancrofti*. *C. annuli-rostris* and *Mansonia uniformis* were also common indoors. Anopheline species were absent from the vicinity of the town; *C. fatigans* is not generally present except in larger coastal towns of New Guinea. There is circumstantial evidence then that *C. bitaeniorhynchus* may be the important vector of *W. bancrofti* in this small inland town of Negeri Besar.

D. S. Bertram

NEHAUL, B. B. G. **Filariasis in British Guiana. Clinical Manifestations of Filariasis due to *Wuchereria bancrofti*.** *West Indian Med. J.* 1956, Sept., v. 5, No. 3, 201-6. [26 refs.]

The author analyses the clinical manifestations in 628 patients with filariasis due to *Wuchereria bancrofti* seen during a period of 6 years in a filariasis clinic in Georgetown, British Guiana. The findings were as follows:—

(1) Attacks of fever and ague	470 (75%)
(2) Lymphangitis	334 (53%)
(3) Adenitis (with pain)	331 (53%)
(4) Funiculitis or thickening of the spermatic cords	75 (29%)
(5) Epididymitis	3 (0.5%)
(6) Pain in or swelling of the testis	14 (2%)
(7) Swelling of the scrotum (and elephantiasis of the scrotum)	17 (3%)
(8) Elephantiasis (limbs)	467 (74%)
(9) Hydrocele	48 (19%)
(10) Chyluria	8 (1%)
(11) Involvement of the breast	28 (8%)
(12) Abdominal filariasis	6 (1%)
(13) Abscesses	115 (18%)

In 278 patients the night blood was examined for microfilariae (by means of the 3-drops technique) and microfilariae were found in 54 (19%).

The author quotes the evidence for and against considering the attacks of lymphangitis to be due to allergy or to infection. He found that sulphonamides and penicillin gave good results, but did not obtain remissions with antihistamines.

It is noted that 43% of the patients reported the presence of filariasis in relatives and 24% in neighbours: 38% of male and 23% of female patients were under 15 years of age.

Frederick J. Wright

JASWANT SINGH, KRISHNASWAMI, A. K., RAGHAVAN, N. G. S., KRISHNAMURTHY, B. S. & MAMMEN, M. L. **Field Studies on the Comparative Effectiveness of D.D.T., B.H.C. and Dieldrin Residual Sprays against the Vectors of Wuchererian Infections.** *Indian J. Malariology.* 1956, Sept., v. 10, No. 3, 239-59, 2 maps & 7 graphs.

Field trials with gamma BHC and dieldrin against *Culex fatigans*, vector of *Wuchereria bancrofti*, were begun in December 1954, in selected parts of the town of Ernakulam in Travancore-Cochin State, South India, and DDT, as well as these two insecticides, was also tested against

Mansonioides spp., vectors of *W. malayi*, in the coastal village area of Shertallai. Water-dispersible powders were used and indoor spraying was done at 200 mgm. DDT, 50 mgm. dieldrin, and 44 mgm. gamma BHC per square foot. Catching stations were sited in the sprayed and in corresponding unsprayed areas. Graphs illustrate the changes in mosquito densities before and after the treatments.

Gamma BHC and dieldrin were best and equally effective against *C. fatigans*, with residual effects for 13 to 14 weeks. *Mansonioides* spp. seemed more susceptible to the insecticides than *C. fatigans*, the densities remaining low for at least 20 weeks after spraying. The general incidence of mosquitoes at rest indoors in the Shertallai area (mainly *Culex gelidus* and *C. vishnui* and also *Anopheles subpictus*) was not, however, held in check for so long, the maximum effective period appearing to be about 12 weeks with dieldrin. 60 of 905 *M. annulifera* and *M. uniformis* were positive for filarial infections in the control area but none of 634 from sprayed areas. [It is not clearly stated how long after spraying these dissections were made.] *C. fatigans* positive for filarial infection were not found in sprayed areas until the 14th week after spraying.

D. S. Bertram

BIAGI F., F. Observaciones sobre mansonelosis en la Península de Yucatán. I. Frecuencia. [**Studies on *Mansonella ozzardi* Infection in the Yucatán Peninsula, Mexico. I. Incidence. II. Clinical Features, Intradermal and Precipitin Reactions**] Reprinted from *Medicina*. Mexico. 1956, Nov. 25, v. 36, No. 760, 521-6, 1 fig. & 2 graphs. II. Manifestaciones clínicas, reacciones intradérmicas y de precipitación. *Ibid.*, Dec. 10, No. 761, 545-8. [16 refs.]

I. The author examined thick blood films from 296 persons in 3 areas in the northern part of the Yucatán Peninsula. The percentages found to harbour *Mansonella ozzardi* were 55.3, 84.9 and 50.6% with an average of 61.1%. The findings, by age, sex and occupation are shown in tables and the results by age and sex compared in figures. No positive results were found in children under 3 years: thereafter the incidence increased with age, and reached 90 to 100% in those over 50 years. The average number of microfilariae per person was about the same in both sexes up to 30 years and thereafter was much higher in men. The incidence was highest in agricultural workers.

II. The clinical histories of 21 persons harbouring *M. ozzardi* were investigated and in some of them intradermal reactions were made with *Dirofilaria immitis* antigen and precipitation reactions made with this and other helminth antigens.

No frankly specific symptoms were noted, the intradermal tests were positive in about half of those tested and the precipitation tests in less than half (and then only with *D. immitis* antigen).

The methods are described and the results tabulated.

No clear relationship was found between these results and the presence of microfilaraemia.

H. J. O'D. Burke-Gaffney

DUKE, B. O. L., CREWE, W. & BEESLEY, W. N. **The Relationship between the Size of the Blood-Meal taken in by *Chrysops silacea*, the Development of the Fly's Ovaries, and the Development of the Microfilariae of *Loa loa* taken in with the Blood-Meal.** *Ann. Trop. Med. & Parasit.* 1956, Sept., v. 50, No. 3, 283-90, 2 figs.

Some biting *Chrysops silacea* are found to have undeveloped ovaries, yet are infected with filarial larvae only a few days old. Flies fed in the laboratory on infected and uninfected volunteers did not develop their ovaries if the meal taken in was less than 3.6 mgm., and in all flies taking more than 14.2 mgm. of blood ovary development was normal. Some flies did not develop ovaries although the meal taken weighed over 10 mgm., and also some flies taking meals as small as 3.6 mgm. (about one-tenth of a repletion meal), developed ovaries. Development of microfilariae taken in with the meal was similar both in flies which developed ovaries and those which did not. Also the presence of microfilariae did not appear to affect ovary development.

B. R. Laurence

MUIRHEAD-THOMSON, R. C. **Communal Oviposition in *Simulium damnosum* Theobald (Diptera, Simuliidae).** [Correspondence.] *Nature*. 1956, Dec. 8, v. 178, 1297-9.

This is an interesting account of direct observation in Liberia of oviposition by *Simulium damnosum* during August on leafy twigs dipping into a stream. Previously, large masses of eggs were observed on similar sites but observation during much of the day had failed to reveal when and how they were laid. Finally a dense swarm of black flies was seen 2 minutes before sunset to arrive over and then settle on a leaf trailing in the water. Mass oviposition began and the flies, forming a line across the leaf, moved progressively towards its base leaving behind a layer of white eggs; the eggs turned brown within a few hours. The same was happening on some but not all leaves nearby. Mass oviposition went on until failing light made further observation difficult. It is thought the swarm of females numbered about 200 or 300. About 50,000 eggs may be laid on a single leaf. There are reasons to suppose that oviposition is not always done in this mass way.

D. S. Bertram

LUBINSKY, G. **On the Probable Presence of Parasitic Liver Cirrhosis in Canada.** *Canadian J. Comp. Med.* 1956, Dec., v. 20, No. 12, 457-65, 3 figs. [40 refs.]

"The findings of *Capillaria hepatica* in Alberta rodents (*Thomomys talpoides* and *Peromyscus maniculatus*) is reported. The literature on

genuine and spurious cases of human infections with this nematode is reviewed. It is pointed out that the aboriginal population of northern Canada occasionally use rodents as food and may, therefore, become infected with this parasite."

LAPIERRE, J. Les traitements actuels de l'oxyurose. [**Current Treatment of Enterobiasis**] *Maroc. Méd.* 1956, Nov., v. 35, No. 378, 1052-7. [23 refs.]

A review.

DEFICIENCY DISEASES

JELLIFFE, D. B. **The Teaching of Nutrition at Maternal and Child Health Centres in the Tropics.** *Central African J. of Med.* 1956, Nov., v. 2, No. 11, 401-4.

Insufficient attention has been given to the opportunities for the techniques of nutrition teaching in maternity and child health centres.

The staff of these centres should have more "pre-assignment" training. This should consist of courses in tropical paediatrics with emphasis on nutrition. Textbooks on these subjects should be prepared and there should be serious study of local practices and resources with regard to infant and child nutrition. Practically nothing on these lines is at present available.

It is pointed out that teaching in these centres would be more successful if it could be more practical and consistent—both for individual and for group teaching. In any case the education of large groups is generally less effective than of small groups or during visits to the homes, or in cooking and food demonstrations. The uses of food models, posters, film strips and films are discussed.

[This article is full of sound ideas which cannot be implemented until the countries concerned give opportunities to paediatricians in both clinical and social medicine.]

Cicely D. Williams

LAL, S. B. **The Nutritional Status of Children in the State of Bihar (Preliminary Observations).** *J. Trop. Pediatrics.* London. 1956, Dec., v. 2, No. 3, 166-9, 1 fig.

This paper records the heights and weights and clinical grading of over 55,000 children aged 2-15 years in Bihar, India. The nutritional grading of 8.7% of the boys and of 7.0% of the girls was "very poor".

R. Passmore

- BRAS, G., WATERLOW, J. C. & DEPASS, E. **Further Observations on the Liver, Pancreas and Kidney in Malnourished Infants and Children. (1) The Relation of Certain Histopathological Changes in Liver, Pancreas and Kidney.** *J. Trop. Pediatrics*. London. 1956, Dec., v. 2, No. 3, 147-58, 2 figs. [30 refs.]

This paper attempts a correlation between the histological evidence of degenerative changes in the pancreas and fatty degeneration of the liver in infants and children. It is based on post-mortem examinations of 51 children diagnosed as having suffered from malnutrition, of 41 children labelled "miscellaneous" and 22 infants who died in the perinatal period.

Of the malnourished infants, 23 had large amounts of liver fat and in 21 of these there were pancreatic changes. Of the "miscellaneous" group, 9 were graded as having large amounts of liver fat and in 5 of these there were pancreatic changes. In this group there were 11 livers in which fat was not evident, but in 3 of these there were pancreatic changes. The conclusion appears to be that degenerative changes of the pancreas may be found at post mortem in children dying from a variety of causes and that it is not necessarily associated either with fatty liver or malnutrition. [See also this *Bulletin*, 1955, v. 52, 568.] *R. Passmore*

- SYMONDS, B. **Fatty Liver Disease in South Trinidad.** *Caribbean Med. J.* 1956, v. 18, Nos. 1/2, 9-12.

In South Trinidad, fatty liver disease is common in children under 6 months old who have been prematurely weaned. There is a high mortality, but many recover rapidly when treated with skimmed milk or other protein-rich mixtures. There is none of the prolonged food intolerance so common in kwashiorkor. At autopsy, intense fatty degeneration of the liver is always present, but the pancreas is almost invariably normal, which may account for the good food tolerance.

R. Passmore

- NICOL, B. M. **The Nutrition of Nigerian Children, with particular reference to their Ascorbic-Acid Requirements.** *Brit. J. Nutrition*. 1956, v. 10, No. 4, 275-85, 1 fig. [11 refs.]

Two groups of 40 Nigerian children were studied for one year while one group received a daily supplement of 40 mgm. ascorbic acid (increased to 80 mgm. for the last 4 months of the study). The children were living on diets similar to that found in a previous survey [this *Bulletin*, 1957, v. 54, 198], which provided about 16 mgm. ascorbic acid daily, after making due allowances for loss of the vitamin in cooking. For about 2 months during the mango season, dietary intake of ascorbic acid was much greater and probably about 170 mgm. a day.

During the year the gain in height by the children receiving the ascorbic

acid supplement was significantly greater than the gain by the control group. Gain in body weight was the same in the two groups; the clinical features noted at examinations of the two groups at the start and end of the trial are described and there were no significant differences in the two groups. It is suggested that the children's average daily intake of ascorbic acid when on their normal diet was not sufficient to maintain a maximum growth rate.

R. Passmore

WATSON, Winifred. **An Outbreak of either Scurvy or possibly Tropical Phlebitis.** *Central African J. of Med.* 1956, Oct., v. 2, No. 10, 365-6.

The author does well to draw attention to an outbreak showing features suggestive of scurvy and also, particularly in those patients with fever, of tropical phlebitis, but further details would be desirable. On the whole the cases seem to the abstracter to resemble scurvy. There is no mention of pitting oedema and, although deep thrombosed veins are not palpable, exquisitely tender thrombosed superficial veins are usually detectable in tropical phlebitis when the clinical condition has fully developed. Thrombosed veins were only rarely palpable in the outbreak reported. The author states that green vegetables were plentiful but does not state whether or not the patients might have been deprived of such sources of ascorbic acid during a preceding dry season.

Frederick J. Wright

VAJIC, B., ŠIBALIC, S. & NAUMOVIC, M. Ein Beitrag zur Kenntnis des Vitamin-A- und Karotingehaltes im Blutplasma von Pellagrakranken. [**Contribution to the Knowledge of Vitamin A and Carotene Levels in the Plasma of Pellagrins**] *Internat. Ztschr. f. Vitaminf.* Berne. 1956, v. 27, No. 2, 169-74, 1 fig.

The English summary appended to the paper is as follows:—

“Vitamin A levels are depressed in the blood of pellagrins, but not carotene levels. It is assumed that the ability to convert carotene to vitamin A is reduced.”

VAJIC, B., ŠIBALIC, S. & RADEJ, N. Über den Nikotinsäuregehalt im Blut von Pellagrakranken. [**The Nicotinic Acid Content of Pellagrins' Blood**] *Internat. Ztschr. f. Vitaminf.* Berne. 1956, v. 27, No. 2, 174-81, 2 figs. [10 refs.]

The English summary appended to the paper is as follows:—

“The nicotinic acid blood level is much lower in pellagrins than in normal subjects. After consumption of maize meal enriched with vitamins of the B group they achieve mean values similar to those of healthy people.”

MEHTA, J. B. **Kwashiorkor Syndrome in Rajasthan.** *J. Indian Med. Ass.* 1956, Nov. 16, v. 27, No. 10, 358-60.

An account of 4 cases.

HANSEN, J. D. L., with the technical assistance of V. JENKINSON. **Electrolyte and Nitrogen Metabolism in Kwashiorkor.** *South African J. Lab. & Clin. Med.* 1956, Sept., v. 2, No. 3, 206-31, 11 figs. [40 refs.]

This paper sets out in full the determinations of sodium, potassium, chloride and nitrogen balances for periods of 7-14 days in 7 infants suffering from kwashiorkor with oedema and low levels of serum albumin. The serum content of electrolytes in a much larger series of patients is given.

In each patient there was an immediate and sustained retention of potassium. This was independent of the nitrogen content of the diet and provides strong evidence that potassium deficiency is an essential feature of the disease. Serum potassium levels were usually, but not always low (below 3.5 mEq. per litre), but levels of potassium in the serum do not reflect accurately the content of the cells. Associated with the diuresis that set in when therapy was well established, there was always a negative sodium and chloride balance.

Nitrogen was always retained as soon as it was given. Observed nitrogen and potassium retentions were as follows:

Case No.	Weight kgm.	Days	Total retention	
			N gm.	K mEq.
1	10.0	7	20	119
2	7.8	14	11	65
3	7.2	14	25	127
4	7.7	12	14	69
5	8.7	13	12	58
6	7.2	12	11	77

The K/N ratio in protoplasm in health is roughly 3 mEq.K/1gm.N. It will be seen that the K/N ratio of the material retained by each patient was greater than this figure. This again emphasizes the importance of potassium deficiency in the disease.

[This is a very well set out account of an important practical problem and all serious students of kwashiorkor will want to read the original paper.]

R. Passmore

SCHWARTZ, Ruth. **Alkaline Phosphatase Activity of the Serum in Kwashiorkor.** *J. Clin. Path.* 1956, Nov., v. 9, No. 4, 333-40, 5 figs. [27 refs.]

In the majority of cases of kwashiorkor studied at Mulago hospital, Uganda, the level of alkaline phosphatase in the serum was low, and

probably related to the growth failure. The sensitivity of the enzyme to activation by Mg^{++} and to inhibition by CN^{-} was investigated and it is concluded that a series of alkaline phosphatases may be present in the serum.

R. Passmore

SPRUE

JUERGENS, J. L., SCHOLZ, D. A. & WOLLAEGER, E. E. **Severe Osteomalacia associated with Occult Steatorrhea due to Nontropical Sprue. Report of Five Cases.** *Arch. Intern. Med.* 1956, Dec., v. 98, No. 6, 774-82. [20 refs.]

"The clinical and laboratory findings in five cases of osteomalacia secondary to an occult steatorrhea are presented. In each case the patient sought medical aid because of severe disabling skeletal pain with few or no symptoms referable to the gastrointestinal tract. The diagnosis of nontropical sprue was made only after a careful search for the underlying cause of the osteomalacia."

HAEMATOTOLOGY

WADSWORTH, G. R. & LEE, T. S. **Estimation of Haemoglobin Concentration in the Tropics by means of Oxyhaemoglobin Solutions.** *Med. J. Malaya.* 1955, Sept., v. 10, No. 1, 87-91. [17 refs.]

The measurement of haemoglobin concentration by determining the light transmission of a dilute oxyhaemoglobin solution is convenient and can be carried out with considerable accuracy. It has been adopted by many laboratories in Britain. It was therefore of interest to see whether there was any objection to using this technique in a tropical climate. The authors, working in Singapore, have made careful comparisons of the estimation of haemoglobin by measuring the oxygen-combining capacity and the absorption of light by an oxyhaemoglobin solution. They found the total experimental error of the second technique so small that its use in the tropics for accurate experimental work seems fully justified. There was some change in the haemoglobin after storage of blood for 24 hours at room temperature (28° - 29° C.) but that change was relatively small and

well within the normal margin of error. This is of particular importance in the tropics where blood samples are often collected away from the laboratory and may not be investigated immediately. *H. Lehmann*

PROC. NUTRITION SOC. 1956, v. 15, No. 2, 101-41, 5 figs. & 1 pl.
[Numerous refs.] **One-Hundredth Scientific Meeting** [DAVIDSON,
L. S. P., Chairman]. **Diet and Anaemia.**

Professor Sir Stanley Davidson in opening the symposium discussed the nutritional anaemias seen in Edinburgh at the present time and as he saw them 36 years ago. Iron deficiency anaemia, he stated, develops now as then, particularly between the ages of 6 and 24 months and among women of child-bearing age. It is, however, not now as prevalent or as severe as then. The main reasons for this reduction are thought to be the results of medical education, the formation of child welfare clinics, the improvement in the diet of the working classes, and the provision under the National Health Scheme of free medical attention for women and children. The incidence of megaloblastic anaemias in Great Britain, however, appears to be greater than formerly, firstly because there are now more older persons living, secondly because the introduction of liver extract and vitamin B12 has increased the expectation of life and therefore the number of persons living with pernicious anaemia, thirdly because increased knowledge is leading to greater recognition of megaloblastic anaemias.

Professor B. S. PLATT discussed factors in food which interfere with blood formation and drew attention to the danger of phytic acid and phosphates liberated by hydrolysis or from dietary sources interfering with absorption of iron. Wheat gluten also might affect the assimilation of iron, vitamin B12 and folic acid. Regarding protein and haematopoiesis, he stated, approximately 2.16×10^{11} erythrocytes were destroyed and replaced daily in the blood of a normal adult male. This represents approximately 6 gm. haemoglobin or about one-tenth of the daily protein requirement. Protein is also present in the intracellular enzymes, the red cell stroma, and in other enzyme systems which are an integral part of the haematopoietic system. Shortage of protein might, therefore, be expected to be an important factor in causing subnormal red cell production, particularly during periods of growth or in the course of infections—and experimental work had borne this out. The view that haemoglobin formation has priority over the formation of other proteins was contested. Experimental work has shown that in pregnant and lactating rats depleted of protein, 30% of the carcass protein might be lost, and this loss was associated with a loss of 55-60% of the total haemoglobin. In these cases a surplus of iron did not counteract the anaemia. It was concluded that an adequate supply of protein is necessary for normal haematopoiesis but "the idea that there is a prior claim for protein in the formation of

new red cells has tended to draw attention away from protein deficiency as an important cause of anaemia ''.

Professor A. W. WOODRUFF drew attention to the prevalence of nutritional anaemias in the tropics and the mortality and morbidity attributable to them. He suggested that of these anaemias the commonest were those associated with iron or protein deficiency or both. Nutritional megaloblastic anaemias, though important, did not appear to constitute a large public health problem but anaemia associated with protein malnutrition or liver damage or both was widespread and deserved closer attention than it had in the past been given.

Dr. P. B. B. GATENBY reported that in Dublin in 1953 the incidence of iron-deficiency anaemia among women attending the Rotunda Hospital during the first month of pregnancy was as high as 33%. This dropped to 12% during 1954 and has remained at that level. Since 1953 anaemia has been specially investigated at the Rotunda Hospital and it is suggested that efficient treatment of iron-deficiency anaemia in one pregnancy can prevent its recurrence in a subsequent pregnancy. The extraction rate of flour had recently been reduced to 80% in Eire and this was considered to favour a rise in the incidence of iron deficiency. Between 1953 and 1955 at the Rotunda Hospital, 37 cases of megaloblastic anaemia in pregnancy had been encountered. It was considered that inadequacy of diet was unlikely to be an aetiological factor in these cases and it was suggested that temporary failure to utilize haematopoietic factors was a more probable cause.

Dr. G. H. SPRAY outlined historically the work on the isolation of pteroylglutamic acid, current hypotheses of its action and of the biochemical defects occurring in macrocytic anaemia.

Dr. J. R. EVANS described work with vitamin B12 labelled with radioactive cobalt. Administration of intrinsic factor to patients with pernicious anaemia resulted in an improvement in the absorption of the vitamin but administration of the factor to patients with megaloblastic anaemia secondary to intestinal disease was followed by no such improvement. In some patients with structural abnormalities of the intestine, sterilization of the bowel corrected inadequacy of absorption, suggesting that bacterial contamination of the small intestine interfered with absorption.

Dr. F. WOKES discussed observations made on persons termed vegans who live on a diet containing no animal food. In approximately 50% of these, dietary deficiency of vitamin B12 with low serum levels occurred and was associated with nervous-system changes but no anaemia. The remaining 50% of the vegans escaped serious illness. Vegans consume large quantities of raw vegetables which by modifying the intestinal flora may favour synthesis of vitamin B12. Vitamin B12 is considered to play a part in the synthesis of methionine and in the reduction of disulphide to sulphhydryl groups. Lack of vitamin B12 might therefore inhibit methionine synthesis, and also, by inhibition of a sulphhydryl system, lead

to abnormal metabolism of tryptophan and tyrosine with accumulation of toxins. This process may explain the development of neurological manifestations in the vitamin B12 deficient vegans. *A. W. Woodruff*

SATYANARAYANAMURTHI, G. V. & BRAHMANANDAM, S. **A Statistical Study into the Incidence and Treatment of Iron Deficiency Anemias in Visakhapatnam.** *Indian J. Med. Sci.* 1956, Sept., v. 10, No. 9, 720-25.

Among 24,277 patients admitted to the medical wards of the King George Hospital, Visakhapatnam, from 1949 to 1953 (inclusive), 1,497 were diagnosed as suffering from anaemia, and an attempt has been made to study the comparative frequency of the various causes responsible.

There were only 340 women in the series but this was accounted for by the small number of beds in the Hospital allotted to women: 6.38% of the patients with anaemia were men and 5.53% were women. The age of greatest incidence in both sexes was 21-30 years and their average monthly income was Rs. 30/-. Among the 1,497 patients, 587 had a haemoglobin value of 15-30% and 727 of 30-50%.

The aetiological factor was considered to be ankylostomiasis in 1,047 (69.9%) patients, hypoproteinaemia in 195 (14%), chronic malaria in 107 (7.2%), chronic malaria plus hypoproteinaemia in 96 (6.4%) and unknown causes in 52 (3.5%) patients.

A special study was made of 22 patients who were placed on a "reasonably balanced and nutritious diet" and given 90 grains ferri et ammonium citrate daily. Although 20 of the 22 had helminthic ova in the stools no anthelmintic treatment was given. Periods in hospital ranged from 21 to 48 days and on discharge 19 had haemoglobin levels of 70% or over, 2 had 68% haemoglobin and one had 44%, although no reason could be found for the failure to respond.

It was concluded that "dietetic deficiency . . . is the prime factor in the initiation of anemia and the coincident ankylostomiasis only precipitates the defect". *A. W. Woodruff*

JONXIS, J. H. P. **The Occurrence of Abnormal Haemoglobins.** *Scottish Med. J.* 1957, Jan., v. 2, No. 1, 1-10, 6 figs.

SMITH, C. H. **The Abnormal Hemoglobins: Clinical and Hematologic Aspects.** *J. Pediatrics.* St. Louis. 1957, Jan., v. 50, No. 1, 91-113. 7 figs. [64 refs.]

KOČJANČIČ, K. **Primer mediteranske anemije pri nas.** [**A Case of Mediterranean Anaemia in Yugoslavia**] *Zdravstveni Vestnik.* Ljubljana. 1956, v. 25, No. 11, 463-8, 3 figs. & 1 diagram. English summary (8 lines).

ROCHE, J., DERRIEN, Y., DIACONO, G., DURIEUX, J., LAURENT, Georgette, REYNAUD, J., ROUX, M. & BRANGIER, J. Coexistence des tares sicklémiqne et thalassémiqne dans une famille tunisienne. Conséquences hématologiques. [**Coexistence of Sicklaemic and Thalassaemic Traits in a Tunisian Family; Haematological Consequences**] *Rev. d'Hématologie*. 1956, Jan.-Mar., v. 11, No. 1, 26-48, 7 figs. & 2 diagrams. [46 refs.]

SHUKLA, R. N. & PARANDE, A. S. **Occurrence of Sickle Cell Anemia and Cases of Sickle Cell Trait in Nagpur.** *Indian J. Med. Sci.* 1956, Nov., v. 10, No. 11, 892-5, 2 figs. on pl. [12 refs.]

RICE, H. M. **Haemoglobin C Disease and Trait. Report of a Family in England with Haemoglobin C.** *Brit. Med. J.* 1957, Jan. 5, 25-7, 4 figs.

"A Jamaican negress immigrant, found to be severely anaemic at routine antenatal investigation, proved to be a case of haemoglobin C disease (CC). Her husband has normal adult haemoglobin (A) only, and her two children have a mixture of A and C. Two of her half-brothers (co-paternal) have been investigated. One has heterozygous C (AC) and one A only.

"The abnormal haemoglobins were demonstrated by electrophoresis on filter-paper at pH 8.6.

"The characteristic diminished osmotic fragility of the erythrocytes and numerous target cells were well shown in this case.

"An incidence of 1 in 6,000 has been suggested for haemoglobin C disease in North American negroes. This and other hereditary haemoglobinopathies should be considered when investigating non-European patients with anaemia."

LIE-INJO LUAN ENG & OEY HOEY GIOK. **Homozygous Haemoglobin-E Disease in Indonesia.** *Lancet*. 1957, Jan. 5, 20-23, 6 figs. [10 refs.]

An account of 3 cases.

GALLAIS, P., COLLOMB, H. & MILETTO, G. Ovalocytose chez des Africains. [**Ovalocytosis in Africans**] *Bull. Soc. Path. Exot.* 1956, July-Aug., v. 49, No. 4, 677-81.

An account of 3 cases in French West Africa.

VENOMS AND ANTIVENENES

GOLDSTEIN, R. [**Scorpion Bite**] *Dapim Refuim*. Tel-Aviv. 1956, Oct.-Nov., v. 15, No. 4, [in Hebrew 252-4. English summary i].

The English summary appended to the paper is as follows:—

“Scorpion bites especially by the yellow scorpion, *Buthus quinquestratus* may sometimes cause serious neurotoxic signs. Manifestations are more serious in younger age and death may occur in children. Three cases, two of them fatal, were described. The signs in cases of bites by scorpion with neurological disturbances were mentioned.

“Treatment with the new neuroplegic drugs used to suppress excitation was evaluated. The use of anti-scorpion serum is proposed.

“We are not certain if oedema of the lungs is a toxic sign or is caused by infusions. However we stress the importance of being careful in following this course of treatment.”

TOXOPLASMOSIS

ANN. NEW YORK ACAD. SCI. 1956, July 5, v. 64, Art 2, 25-277, numerous figs. **Some Protozoan Diseases of Man and Animals: Anaplasmosis, Babesiosis, and Toxoplasmosis** [COLE, Clarence R., Conference Organizing Committee Chairman]. [Conference held Nov. 17 & 18, 1955.]

The New York Academy of Sciences organized in the summer of 1956 a conference on certain diseases affecting man or animals and caused by a group of protozoa whose classification is still in doubt. Parts I and II were devoted to infections involving the red blood cells and causing the important veterinary diseases anaplasmosis and babesiosis. Papers in these two parts can be usefully studied by medical workers for the light they shed on tick-borne diseases of man and from the point of view of the general classification of blood protozoa, *e.g.*, the paper by W. O. NEITZ gives a new classification of the piroplasms of domestic animals, and that by J. CARMICHAEL summarizes treatment and control; moreover, anyone who examines blood films of animals, including cold-blooded vertebrates, will find good descriptions here of organisms which often give rise to difficulty in identification (S. JAKOWSKA and R. F. NIGRELLI). [In many of these papers there is a persistent use of terms like “gametocyte”, “sporozoite”, “gamonts” etc., applied to parasites in which a sexual cycle is still unproved and is probably unlikely; this obsession, which probably stems from the discovery of the dramatic

cycle of *Plasmodium*, may well be blinding observers to the true nature of these organisms.]

Part III is of more direct interest to medical workers in that it is largely devoted to toxoplasmosis, either summarizing our present-day knowledge of the problem as in the introductory remarks of F. S. MARKHAM and in the final paper by D. E. EYLES, or presenting new aspects which are reviewed briefly below.

L. JACOBS (*Propagation, Morphology, and Biology of Toxoplasma*, p. 154). Tissue culture of *Toxoplasma* in mouse embryo fibroblasts or in HeLa cells is a good method of preserving or even isolating the organism; live storage in rats is also possible, or *Toxoplasma* may be "banked" in hibernating marmots or in glycerinated suspensions in deep freeze. There is a striking difference between the "proliferative" and the intracystic forms, e.g., in cytochemical reactions. In addition to nearly all mammals and birds, reptiles have now been shown susceptible to this infection. The specificity of the dye test has been confirmed, sera of animals infected with *Trypanosoma cruzi*, *Plasmodium berghei*, *Eimeria tenella*, *Hepatozoon* sp., *Sarcocystis* spp., *Encephalitozoon* and *Besnoitia* showing no or very low titres. Toxoplasmosis is more prevalent in warm, moist climates than in either cold or warm, dry places.

H. A. FELDMAN and L. T. MILLER (*Congenital Human Toxoplasmosis*, p. 180). A preliminary analysis is made of 187 cases of congenital toxoplasmosis, of which 68% of the patients were 4 years old or less, 22% 5 to 9 years, and 10% 10 to 19 years. The congenital disease occurs when a non-immune woman contracts an inapparent infection during pregnancy, and the effect on the child is more catastrophic the earlier the infection occurs in gestation. In the authors' experience only one congenitally infected offspring was produced by a mother. 108 children had chorioretinitis, 82% in both eyes, and most children showed some degree of damage to the brain. There was no seasonal change in the distribution of cases of the congenital disease.

J. C. SIM (*Toxoplasmosis Acquisita Lymphonodosa: Clinical and Pathological Aspects*, p. 185). Diagnosis of toxoplasmosis can only be satisfactorily made either by the isolation of the organism or by the demonstration of rising titres of antibodies in the serum. Four types of the acquired disease can be recognized, lymphadenopathy, typhus-like exanthema, meningo-encephalitis and chorioretinitis; 4 cases of the first are described in detail. Rhesus monkeys were infected experimentally and developed a disease resembling the human form.

H. F. EICHENWALD (*The Laboratory Diagnosis of Toxoplasmosis*, p. 207). There are 3 laboratory methods for diagnosing toxoplasmosis: isolation of the organism, serological tests and cutaneous sensitivity tests. For isolation of the organism, mice, hamsters and guineapigs are the most susceptible animals [but see LAINSON, this *Bulletin*, 1956, v. 53, 1168], and the administration of cortisone increases the chances of infection. The author makes the surprising statement that it is not sufficient to

diagnose *Toxoplasma* on "cytologic grounds alone", but that identification is only certain by the use of "serologic methods" [if vice versa, this would be a much more acceptable conclusion]. Useful details are given for the performance of the dye test and for the complement-fixation reaction, and a congenital case is described in which the dye test (and the complement-fixation) titre began to decline at the age of 6 months and continued to decline until the child died at 19 months, although at autopsy the organisms were readily isolated from the brain. The complement-fixation test becomes negative fairly soon, and in 44 out of 60 children aged 5 years the test was negative.

J. K. FRENKEL (*Pathogenesis of Toxoplasmosis and of Infections with Organisms Resembling Toxoplasma*, p. 215). Infection with *Toxoplasma* may be acute, asymptomatic, or chronic. The chronic variety is usually maintained by cystic forms in the central nervous system, the eye or the myocardium. These forms may be reactivated by waning of immunity, or artificially by the administration of cortisone, when symptoms due to hypersensitivity may arise. There is a useful description of allied organisms which may give rise to difficulty in diagnosis: *Encephalitozoon*, "M-organism", *Sarcocystis*, *Besnoitia*, *Globidium*, leishmanial forms, *Cryptococcus*, *Histoplasma*, *Klossiella* and coccidia. Good photomicrographs illustrate the appearance of these parasites.

W. L. JELLISON (*On the Nomenclature of Besnoitia besnoiti*, a Protozoan Parasite, p. 268); and W. L. JELLISON, W. J. FULLERTON and H. PARKER (*Transmission of the Protozoan Besnoitia jellisoni by Ingestion*, p. 271). Two short papers deal respectively with the nomenclature of the genus *Besnoitia* and the transmission of *B. jellisoni* by feeding the organism to mice.

D. E. EYLES (*Newer Knowledge of the Chemotherapy of Toxoplasmosis*, p. 252). Until recently the chemotherapy of toxoplasmosis was negligible, but now, as a result of animal experimentation, some useful drugs have been found and effective treatment of the human disease has become possible. Two groups of drugs are active, the sulphonamides and pyrimethamine (Daraprim) in high dosage (*e.g.*, an initial dose of 50 mgm. followed by 25 mgm. 6 hours later and 25 mgm. daily for two weeks). Sulphamethazine, sulphamerazine and sulphadiazine are the compounds of choice (6 gm. daily). These two groups act best when combined, giving rise to a synergistic effect while blocking the use of para-aminobenzoic acid, folic acid and folinic acid. Acute cases of the acquired disease may be cured by these drugs; congenital cases are usually too advanced to be much affected, but ocular toxoplasmosis apparently responds readily.

P. C. C. Garnham

BLANC, G. Toxoplasmose. [**Toxoplasmosis**] *Maroc Méd.* 1956, Nov., v. 35, No. 378, 1097-1111, 4 figs. [Refs. in footnotes.]

A review.

GIBSON, C. L. **Distribution of *Toxoplasma* Antibodies in Comparable Urban and Rural Groups.** *Pub. Health Rep.* Wash. 1956, Nov., v. 71, No. 11, 1119-23, 3 figs.

The Sabin-Feldman dye test was performed on the serum of 627 Negro students aged 11 to 19 years living in the town of Memphis, Tennessee, and the results were compared with those obtained from 445 children of similar ages living in a rural environment nearby. Positive sera were found in 20.1% of urban boys and 20.7% of urban girls, as compared with 19.9% and 17.8% of rural children. Such a difference is not statistically significant, but a striking difference (probably of a non-specific origin) was found in the percentage positives of undiluted sera from boys (2.3%) as compared with girls (7.0%). Higher titres were found in the rural populations, but otherwise the two groups were essentially the same. The factors responsible for transmission must thus be common to both environments.

P. C. C. Garnham

WASSERMAN, L., GAVRILIȚA, L., MARCULESCU, T., CHIPAIL, A. & PATRAȘCANU, V. Contribuții anatomo-clinice în toxoplasmoza congenitală umană. [**Contributions to the Pathology and Clinical Aspects of Congenital Toxoplasmosis**] *Studii și Cercetări Inframicrobiol., Microbiol. și Parazitol.* 1956, Jan.-June, v. 7, Nos. 1/2, 203-19, 19 figs. on 10 pls. [28 refs.] French summary.

The authors describe the clinical course and morbid anatomy of 4 fatal cases of congenital toxoplasmosis occurring in infants in the first 6 weeks of life. The onset was acute with fever, accompanied by convulsions, hemiplegia or upper respiratory infection. Other features were dehydration, contractures, bronchopneumonia, dysphagia, nystagmus, oedema and hydrocephalus. Death occurred after 22-48 days. At autopsy there was encephalomalacia with cyst formation involving both hemispheres and loss of convolutions. Microscopical examination of the brain showed the presence of perivascular miliary granulomata composed of mononuclear cells with plasma cells and eosinophils, often coalescing into plaques and undergoing colliquative necrosis and calcification; toxoplasms were seen around the periphery of the lesions.

D. J. Bauer

ETCHEVERRY, R., REGONESI, C., GUZMAN, C., KATALINIC, V., NAQUIRA, F. & THIERMANN, Erica. Toxoplasmosis adquirida. Forma ganglionar. [**Acquired Toxoplasmosis. Glandular Type**] *Bol. Chileno de Parasit.* 1956, Apr.-June, v. 11, No. 2, 22-7, 2 figs. [14 refs.]

The English summary appended to the paper is as follows:—

“Two cases of subacute benign cervical adenitis due to *Toxoplasma* infection in adults are described. In both cases the diagnosis was made by demonstration of the parasite. The first case presented a clinical

picture simulating infectious mononucleosis, but the Paul Bunell test was negative and Sabin-Feldman test was strongly positive. The parasite was found by inoculating mice with the material obtained by a puncture of an enlarged lymph node.

"In the second case the parasite was found both in the histological section of an excised lymph node and in the organs of mice inoculated with the biopsy material.

"The most outstanding facts concerning toxoplasma adenitis are reviewed."

EYLES, D. E. & COLEMAN, Nell. **Relationship of Size of Inoculum to Time to Death in Mice infected with *Toxoplasma gondii*.** *J. Parasitology*. 1956, June, v. 42, No. 3, 272-6, 1 fig.

A brief account is given of a quantitative study on the relation of the number of toxoplasms inoculated to the time of death of the host, as well as of the LD50 inoculum. These data were obtained by intraperitoneal inoculation of groups of mice with serum or saline suspensions of the peritoneal exudate of infected mice containing known numbers of *Toxoplasma* (counted in a haemocytometer).

The relation between the size of the inoculum (given in tables and graphs) was found to be expressed by a linear regression on the logarithm of the number of organisms inoculated into the mice. Furthermore, the time of death depended upon whether the organisms were suspended in serum or saline. The latter had a harmful effect upon the toxoplasms, on account of which the death point in mice was retarded as compared with the serum suspension. Moreover, one or two toxoplasms suspended in serum caused fatal infections, whereas infections produced by the same number suspended in saline usually failed to kill the animals. The LD50 inoculum for organisms suspended in serum was found to be one, compared with 30 suspended in saline.

C. A. Hoare

DERMATOLOGY AND FUNGUS DISEASES

HIGDON, R. S. **Intertriginous Moniliasis in the Far East Command.** *Arch. Dermat.* 1956, Dec., v. 74, No. 6, 620-26, 3 figs.

Acute intertriginous candidiasis (*Candida albicans*) of the groin area affects from 200 to 300 men of the United States Forces in the Tokyo area of Japan every year during the hot, humid summer season, and constitutes a serious medical problem. The condition is relatively uncommon among the civilian population and it is almost unknown in the American female staff. It has been suggested that the heavy, warm,

close-fitting cotton uniforms worn by the men, which prevent adequate ventilation of the groin area and encourage a state of humidity of the skin, are conducive to the infection. With the onset of the cool season the disorder resolves spontaneously.

The earlier forms of treatment, which included topical application of Castellani's paint, gentian violet in 0.1 to 0.5% solution, and polyethylene glycol sulphur ointment, gave disappointing results. The more recent use of a nystatin shake lotion prepared by adding 4 ground-up tablets of nystatin, containing each 500,000 units of the antibiotic, to a basal lotion composed of talc, 6 gm.; zinc oxide, 6 gm.; glycerin, 6 ml.; bentonite magma [suspension], 12 ml. and water *q.s. ad* 60 ml., gave excellent results. The lotion was applied 3 times daily, and a noteworthy feature of the treatment was the rapid relief of pruritis and other symptoms, which occurred within 12 to 24 hours. Clinical cure was effected in 52% of a group of 25 patients after treatment for 9-21 days; 40% showed clinical improvement and relief of symptoms, but 8% (2 patients) showed neither symptomatic nor clinical improvement after 14 days' treatment. Relapse, necessitating a second course of treatment, occurred in 4 of the apparently cured patients. No instance of intolerance, aggravation of the eruption, or development of untoward side effects, was observed. The ultimate cure was greatly hastened, in the severe cases which were treated in hospital, by the use of a wind tunnel formed by placing an arched metal frame over the patient, in bed, covering the frame with a sheet and directing a continuous current of air, by means of an electric fan, from the foot of the bed.

As the potency of the nystatin lotion tends to deteriorate rather quickly, the lotion was issued, freshly prepared, in 2 ounce (60 ml.) bottles and stored in the refrigerator when not in use. Nystatin ointment is more stable, but it was found unsuitable, as an occlusive grease applied to this condition, in the existing circumstances, would be intolerable.

The introduction of nystatin therapy was followed by a very marked reduction in the number of patients with intertriginous candidiasis seeking admission to hospital in the following year.

J. T. Duncan

VANDEPITTE, J., BEECKMANS, G. & NINANE, J. Premier cas de pied de Madura par *Madurella grisea* au Congo Belge. [**The First Case of Madura Foot caused by *Madurella grisea* in the Belgian Congo**] *Ann. Soc. Belge de Méd. Trop.* 1956, Aug. 31, v. 36, No. 4, 493-7, 4 figs. on 2 pls.

This is the first case of mycetoma of the black grain type to be reported in the Belgian Congo. The patient, a male African aged 30, from Bena Kamanga in Demba, had suffered for 2 years with a disabling mycetoma of the right foot. The affected part was very painful and tender on pressure and could not support the man in walking. The deformity and swelling of the foot, as in all other reported instances of mycetoma in the

Congo, was not of the characteristic globular form which prevents the toes from resting on the ground surface. In the skin over the swelling were several soft or fluctuant nodules and some scars of healed sinuses. On incising one of the nodules, a drop of sanguinolent pus was released which contained numerous minute black grains, like coal dust, measuring less than 0.5 mm. in diameter. These grains, when sown on glucose agar, yielded little white, fluffy growths visible in 48 hours when incubated at 25°C., and little white, duvetted colonies up to 5 mm. in diameter in 4 days. The description of this fungus, which was identified as *Madurella grisea*, is given by VANBREUSEGHEM [below].

An X-ray examination showed a vacuolated or worm-eaten appearance, caused by alternate areas of osteolysis and osteosclerosis, affecting all the phalanges and the metatarsal of the fourth toe, with extension to the cuboid, the third metatarsal and probably the third cuneiform.

In view of some encouraging results obtained in the treatment of other cases of mycetoma [this *Bulletin*, 1955, v. 52, 297], the triple sulphonamide (Sulphatriad) was administered in daily doses of 6 gm. during two 10-day periods, the total dosage being 128 gm. After this, isethionate of pentamidine was given in daily doses of 200 mgm. by intramuscular injection over two further 10-day periods, to a total of 4 gm. At the end of the first 10-day course of sulphonamides, the pain was markedly relieved and thereafter there was considerable subsidence of the swelling and the associated inflammation. At this stage the condition became stabilized, but the infection remained active and, throughout the entire 4 months in hospital, it was always possible to obtain viable "grains" from the lesion. Pentamidine had no observed effect on the disease.

The patient left hospital when he could walk without the aid of a stick, but it was presumed that the disability would recur with an attempt to resume normal activities.

J. T. Duncan

VANBREUSEGHEM, R. A propos d'une souche de *Madurella grisea* Mackinnon 1949 isolée au Congo Belge. [Concerning a Strain of *Madurella grisea* isolated in the Belgian Congo] *Ann. Soc. Belge de Méd. Trop.* 1956, Aug. 31, v. 36, No. 4, 467-77, 4 figs. on 2 pls. [15 refs.]

The fungus isolated in culture from a case of mycetoma of the black grain type in the Belgian Congo by VANDEPITTE *et al.* [above] was identified by Vanbreuseghem as *Madurella grisea* Mackinnon *et al.* [this *Bulletin*, 1950, v. 47, 490].

The general characters of the fungus were as follows. Growth on all media was good at 25°C. but slow and restricted at 37°C. The diameters of a colony at 1, 2 and 3 weeks on glucose agar were, at 25°C., 14, 23 and 30 mm., respectively, and at 37°C., 2, 3 and 4 mm. A transplant from an old culture may fail to develop when incubated at 37°C. but will grow well when transferred to a fresh medium and incubated at 25°C.

The mature colony on glucose agar is round and flat but acuminate at the centre. It is covered with a dark grey feltwork of short aerial mycelium; the reverse surface of the colony is nearly black except at the edges where it is dark grey. Little black sclerotia may be found, after a few weeks, in cultures on media containing glucose, saccharose or maltose, sometimes also with galactose, but not with lactose or raffinose. These sclerotia, which measure 1–2 mm. in diameter, are hard and black and are formed of a mass of round or polyhedral cells 2–4 μ in diameter embedded in an intercellular material. Sclerotia are numerous in the depth of the agar under the colony and a few may be found at the surface 2 to 3 mm. from the edge of the colony.

The mycelium consists of hyphae at first hyaline and sometimes torulous, later becoming fuliginous and larger, with septal swellings recalling the appearance of bamboo. No reproductive forms were found, but hyphal anastomoses were very free especially in well-aerated cultures. In contrast to the rich, duvetted cultures developing at 25°C. those incubated at 37°C. were small, glabrous, humid and cerebriform; their microscopic morphology was not studied.

Much of the paper is devoted to a discussion on the nomenclature of the genus *Madurella*, in which the author accepts the view of Mackinnon *et al.* [*loc. cit.*] that *Madurella mycetomi* (Laveran, 1902), Brumpt, 1905, is *nomen nudum* and should be rejected. He does not, however, accept Mackinnon's revalidation of the species [*ibid.*, 1952, v. 49, 994], but, instead, he supports the recommendation of LACAZ and NETTO [*ibid.*, 1957, v. 54, 86] that *Madurella tozeuri* (Nicolle and Pinoy, 1908) Pinoy 1912, be accepted as the type species, and *Madurella mycetomi* be relegated to its synonymy. The only valid species of *Madurella* are *M. tozeuri* and *M. grisea*.

J. T. Duncan

VANBREUSEGHEM, R., COURTOIS, C., THYS, A. & DOUPAGNE, P. Deux cas de mycétomes congolais par *Nocardia brasiliensis*. [**Two Cases of Mycetoma in the Belgian Congo, caused by *Nocardia brasiliensis***] *Ann. Soc. Belge de Méd. Trop.* 1956, Aug. 31, v. 36, No. 4, 479–85, 10 figs. on 5 pls.

Two new cases of mycetoma have been identified in the Belgian Congo, bringing the total number described in that country to 11. Like the first 9 cases, the present 2 did not show the globular deformity of the foot with great convexity of the sole which prevents the toes from resting on the ground surface. [See COURTOIS *et al.*, this *Bulletin*, 1955, v. 52, 297.]

The first patient, a male African aged 30, living at Lokandu, had suffered from mycetoma of the left foot for 2 years. Pus from the fistulae contained little soft, white grains measuring less than 1 mm. in diameter. From these, a species of *Nocardia*, identified as *N. brasiliensis*, was isolated. An X-ray examination showed destructive changes in all bones of the tarsus, the heads of the metatarsals and the lower epiphysis and

part of the shaft of the tibia. There were changes in the articular surfaces of all the affected bones, spontaneous fracture of the cuboid and subluxation of the tibial epiphysis.

In the second case the disease affected the region of the right knee of a male African aged 50, an agriculturist. Only the soft parts were involved and it was possible, by surgical excision and skin grafting, to effect a cure. *N. brasiliensis* was isolated also from the small white grains in the lesions of this case. After the operation an inguinal lymph node became involved and *N. brasiliensis* was isolated from it.

Tissue sections from the lesions in both cases showed the characteristic histopathology of mycetoma and some of the parasitic "grains", formed of slender filaments, were surrounded by radially arranged, eosinophil club formations.

The cultures from the 2 cases showed minor differences in their enzymatic powers on milk and gelatin, but in other respects they were similar. Their gross characters in culture (temperature of incubation not stated) were as follows: on 2% glucose agar after 2 months—a dry, whitish or yellowish-white, mammilated colony, with broadly festooned borders; reverse surface salmon yellow to ochre and a clear yellow pigment diffusing into the agar medium; the culture had an odour of fresh earth. After 1 month in 2% glucose broth, surface colonies were dry or humid, chamois to rose colour, sometimes powdered white; on potato there was a granular, chalky, rose coloured growth; on Czapek-Dox agar, white chalky colonies; on coagulated serum there was no appreciable growth or only very slight vegetation.

Microscopically, smears from a 1-month-old culture on glucose agar showed slender, long and branching or shorter filamentous forms, and bacillary and coccial forms, which were Gram-positive and acid-fast (5% sulphuric acid only).

From these characters the strains were distinguished from *N. asteroides*, *N. pelletieri*, *N. maduræ* and *N. paraguayensis*, and identified as *Nocardia brasiliensis* Lindenberg 1909.

J. T. Duncan

KAKOTI, L. M. & DEY, N. C. **Mycetoma caused by *Glenospora semoni*.** *Indian J. Med. Sci.* 1956, Nov., v. 10, No. 11, 889-91, 8 figs. on 2 pls. [13 refs.]

BENEDEK, T. **Budding and Mycelium Formation in the Life Cycle of *Coccidioides immitis* Rixford and Gilchrist, 1896—in vivo. (With a Review of the Literature.)** *Mycopathologia.* The Hague. 1956, Dec. 1, v. 7, Nos. 3/4, 251-6, 12 figs. on 7 pls. [24 refs.]

The author reviews a number of published reports on the occurrence of abnormal budding forms of *Coccidioides immitis*, resembling *Blastomyces*

dermatitidis, the occurrence of a mycelial form of the fungus *in vivo* in coccidioid infections of man and animals, and the production of a sporangial form, resembling the parasitic form, in artificial culture. He describes a case of coccidioidomycosis in which *C. immitis* was present in the pus of an abscess, and apparently also in the circulating blood, in the mycelial form.

A white woman aged 30 had suffered for several years from a chronic, debilitating pulmonary disease which was eventually diagnosed as coccidioidomycosis on the basis of microscopical examinations of the sputum. She lived in the "Middle West" and had never been exposed to infection in any known endemic area of coccidioidomycosis. This is regarded as evidence that the infection is not confined to the recognized endemic areas. While in hospital, the patient developed a large subcutaneous abscess in the left buttock, and pus aspirated from this abscess was found to contain fungal mycelium and budding cells as well as the sporangia of *C. immitis*. Fungal mycelium, presumed to be that of *C. immitis* was also seen in the fluid of an artificially produced blister, which is accepted as evidence of the presence of the fungus in the circulating blood. Unfortunately, textual descriptions are omitted, as the author considers that the photomicrographs of the objects seen "serve to add more to our knowledge of the life cycle of *C. immitis in vivo* than any descriptions". The sporangial bodies in the pus are regarded by the author as ascocarps and the contained endospores as asci.

The occurrence of a mycelial form of *C. immitis* in the tissues in coccidioidomycosis has been described by FORBUS and BESTEBREURTJE; PUCKETT, and FIESE *et al.* [this *Bulletin*, 1948, v. 45, 269; 1954, v. 51, 1293; 1956, v. 53, 242].

J. T. Duncan

TROPICAL ULCER

ROSS INSTITUTE INDUSTRIAL ADVISORY COMMITTEE. LONDON SCHOOL OF HYGIENE AND TROPICAL MEDICINE. Information and Advisory Service. 1956, Nov., Bull. No. 4, 11 pp., 3 figs. [Originally issued Sept. 1950, re-written Nov. 1956.] **Tropical Ulcer.**

This bulletin on tropical ulcer is written for non-medical people and is intended to stimulate interest in the prevention and effective treatment of this condition, which is still a frequent cause of morbidity both in estate labourers and indigenous peoples. The pamphlet is both interesting and clear and if the measures recorded for the prevention and treatment are carried out, there should be a welcome reduction in the frequency of this complaint. Surgical treatment requires the services of a doctor and

the bulletin's chief function will be to provide medical officers with a document from which to teach employers and assistants the requirements for success. [In the section on aetiology the causative factors are stated with perhaps more certainty than the accumulated and somewhat conflicting evidence justifies for scientific accuracy, but dogmatism is desirable in a pamphlet of this character.]

Frederick J. Wright

MISCELLANEOUS DISEASES

LE MUET, G. Aspect actuel du géophagisme au Maroc. A propos de 300 cas. [**An Appraisal of Geophagism in Morocco, based on 300 Cases**] *Maroc Méd.* 1956, Oct., v. 35, No. 377, 933-41, 2 figs. [10 refs.]

Geophagy is still practised to a considerable extent in rural Morocco but only by children and women. In one locality 30% of children under 4 years of age were found to eat earth. Among women the practice occurs chiefly during pregnancy and the puerperium. The relative frequency between boys and girls is 3:1. The author finds that in Morocco there is no relationship to hookworm infection and he attributes the practice to the unsupervised toddler's habit of indiscriminately placing objects in the mouth and of copying his companions. Further, the earth gives rise to pleasurable mastication and some relief to the feeling of emptiness in the abdomen of an underfed child. During pregnancy there is in some quarters the belief that earth is a necessary ingredient for the nourishment of the foetus and the silicates probably give some relief to the nausea and abdominal discomforts which may arise during pregnancy.

The author finds the habit in children associated with retarded growth, a protuberant abdomen and anaemia, and frequently with hepatosplenomegaly in the absence of malaria. Among 300 children with geophagism the author found intestinal parasites in only 119, including *Ascaris lumbricoides* in a number not specified. He notes that MATHIEU found that 115 of 225 children with geophagism harboured this helminth. The author presumes that earth interferes with the absorption of iron and other constituents of the food and there is in addition the possibility of ingestion of parasitic ova or larvae. He gives an entertaining review of the history of geophagism and the superstitions connected with the practice.

Frederick J. Wright

CABANNES, R. Réflexions sur le favisme. A propos de trois observations algériennes. [**Favism; Three Cases in Algeria**] *Algérie Méd.* 1956, June, v. 60, No. 6, 465-76. [33 refs.]

LIPPARONI, E. Complementi di nosografia somala e note cliniche relative. [**Contribution to the Nosography of Somaliland with Clinical Notes related thereto**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1956, Sept., v. 37, No. 9, 477-507. English summary (5 lines).

The author gives short clinical notes concerning a large number of little-known tropical disease conditions, many of minor importance, that he encountered during 20 years of medical service in Somaliland. [See also this *Bulletin*, 1954, v. 51, 986.] Norman White

DODU, S. R. A. & EDINGTON, G. M. **A Case of Primary Hypersplenism in the Gold Coast.** *West African Med. J.* 1956, Dec., v. 5 (n.s.), No. 4, 150-53.

PAYET, M. & PÈNE, P. Les cardiopathies en milieu africain. [**Cardiopathies in African Populations**] *Bull. et Mém. École Préparatoire Méd. Pharm. de Dakar.* 1955, v. 3, 16-26. [30 refs.]

Cardiac disease, it is stated, has an important place among diseases of Africans in Senegal, and in this study of 132 cases many different conditions were encountered. The majority of the patients were young and among those suffering from cardiac insufficiency there were almost twice as many women as men. It is thought that repeated pregnancy plays an important part in bringing about this unequal sex distribution.

Concerning the forms of cardiac disease encountered, it is reported that the type caused by rheumatism is common although typical articular rheumatism is rare. The picture of fully developed cardiac rheumatic disease was seen in 17 persons aged between 12 and 20 years. All were seriously ill and 8 died. At autopsy evidence of active rheumatic pancarditis was found.

In one year 6 persons with pure mitral stenosis were seen, all were young and 5 were women or girls. Although a clinical history in these cases was devoid of outstanding features they presented as classical cases of mitral stenosis.

Only 1 case of congenital heart disease has been encountered in the study.

Patients with myocarditis constitute an important group; 37 were encountered and 25 of these were women. They presented with features of myocardial insufficiency occurring for the first time during the course of pregnancy, a nutritional disease, or an infection with typhoid fever, ankylostomiasis or malaria.

Hypertensive cardiac disease, it is stated, is common in Africans; 25 cases were included in this series and the incidence was equal among the sexes.

Syphilis is considered to be responsible for a proportionately greater amount of cardiac disease than in Europe.

Bacterial endocarditis, pericarditis and atheroma all appeared to be rare.

[Of particular interest in this study is the incidence of rheumatic cardiac disease. This has been held to be rare in Africans but the picture of its distribution which appears to be emerging is that although uncommon in the tropical rain forest belt it is to be found there and that in the drier country to the north it is commonly encountered. Dakar, where this study was carried out, falls, of course, into the latter category. The Medical School at Dakar is to be congratulated upon the regular production of their *Bulletin* in which so many papers of value, including this one, are published, and in which their very great experience is reviewed.]

A. W. Woodruff

DAVIES, J. N. P. **Endomyocardial Fibrosis in Uganda.** *Central African J. of Med.* 1956, Sept., v. 2, No. 9, 323-8, 2 figs. [17 refs.]

In this paper it is stated that among Uganda Africans coronary thrombosis, thyrotoxic heart disease and subacute bacterial endocarditis are rare, and severe atheromatosis, malignant hypertension and acute rheumatic carditis are very uncommon. All these conditions, however, occur in Uganda and infective heart disease, syphilis, purulent pericarditis, acute bacterial endocarditis and renal hypertensive disease are common. There are many unexplained cases of heart disease and from this group endomyocardial fibrosis has recently been separated [this *Bulletin*, 1955, v. 52, 203, 205, 689; 1956, v. 53, 498, 1053]. Autopsies revealed that this was the cause of death in 14.3% of 231 cases of heart disease in Kampala between 1951 and 1953. Although published reports are few, the disease is suspected to have a wide distribution throughout East and West Africa.

After outlining the pathology and clinical features of the disease the author states that it is considered to be a clear-cut clinical and pathological entity. No answer can be given to the question whether it is an African or a tropical disease. It has been described in non-tropical regions among persons some of whom have never visited the tropics, but among them embolic phenomena have been common whereas they are rare in endomyocardial fibrosis.

The pathogenesis of the condition is difficult to understand since at present only the terminal stages are recognizable. There appears to be no loss of myocardial tissue and this suggests that the lesion results from the organization of the thrombus. If, however, an endocardial thrombus is the initial lesion it is to be expected that peripheral embolic lesions would occur commonly, and as they do not do so it is suggested that the initial lesion must be in the myocardium with secondary involvement of the endocardium. There is so far no clue as to the cause of the presumed initial myocardial injury and, until this can be recognized, ideas about aetiology and pathogenesis will remain speculative. In Dakar and in

South Africa, however, knowledge exists of forms of heart disease which may be related to endomyocardial fibrosis. In Dakar, cases of intra-cardiac thrombosis have been reported after surgical operations and are probably secondary to myocardial injury of an obscure type. In South Africa mural thrombosis is not uncommonly seen in malnourished Africans who also suffer from liver disease.

A. W. Woodruff

CHAUDHURI, R. N. **Tropical Eosinophilia.** *J. Indian Med. Ass.* 1956, Sept. 16, v. 27, No. 6, 195-201. [46 refs.]

The earliest record of tropical eosinophilia in India was by ROY and BOSE in 1918 (*Calcutta Med. J.*, 1918, v. 12, 268), and the author refers to the work of WEINGARTEN [see this *Bulletin*, 1943, v. 40, 407] whose great merit lies in the fact that he placed treatment on a rational basis. The pathology as it occurs in India has been described by VISWANATHAN [*ibid.*, 1947, v. 44, 753] as scattered areas of interstitial fibroblastic proliferation and eosinophilic infiltration in the lung.

In the present paper the clinical features of interest are assessed in 167 patients in hospital in Calcutta. One characteristic was the intermittent nature of the attacks, which appeared as bronchitis, though some patients had bouts of fever, while others again were afebrile. The liver was enlarged in 52 cases, the spleen in 14, lymph glands in 5. Pulmonary symptoms were inconstant, and very often without asthma, as many as 42 patients had no pulmonary complaints and were admitted for other ailments, most gastro-intestinal. Eosinophilia was marked, but a fall in the eosinophils was observed in associated, infective febrile bouts in 8 patients. It is conjectured that in acute infections there is hyperfunction of adrenals with liberation of epinephrine-like substances causing a temporary depression of blood eosinophils.

The absolute number of eosinophils was 2,000-40,000 per cmm. and the total white count varied from 10,000 to 45,000 per cmm. These eosinophil cells were essentially mature segmented forms, but occasionally polylobular and vacuolated cells were present. There was no constant correlation between the degree of eosinophilia and intensity of symptoms. Bone-marrow smears showed an increase of eosinophilic cells in all stages of development. Normoblasts constituted 20-25% of nucleated cells.

Liver biopsy showed cellular, mostly eosinophilic, infiltration along the portal tracts in addition to large numbers of eosinophils in the sinusoids. About 25% of the patients had helminthic infections, including *Ascaris* and microfilariae (in 2).

Mottling, increased hilar shadows and increased striations were frequent radiological findings. "Snow-storm" appearance, mottling — fine or coarse—and "ground-glass appearance" were described in typical cases. The radiological abnormalities often regressed after treatment and re-appeared with relapse.

The earlier patients received intravenous neoarsphenamine in doses of 0.3 to 0.45 gm. given at intervals of 5 days: the average total number of injections being 6. Later, intramuscular injections of diethylamine acetarsol in a dose of 3 cc. for adults, each cc. containing 0.05 gm. of pentavalent arsenic, at intervals of 3 days, cured the vast majority after 6-10 injections. In many the response was striking. In patients with chronic asthma, however, the clinical improvement was not so satisfactory, although the eosinophil level decreased. Diethylcarbamazine (Hetrazan), in daily doses of 600-800 mgm. for 7 to 10 days, was found "fairly effective" in 10 out of 12 patients, and with this and with other piperazine compounds, a striking diminution of eosinophils was registered. Prednisone (an analogue of cortisone) 10 mgm. thrice daily for 7-10 days gave good results, clinical, radiological, and haematological, in all but 2 out of 9 patients. The eosinophil counts were reduced to normal in most, but tended to rise after completion of treatment together with reappearance of radiological mottling in the lungs.

After a full discussion of aetiology it is concluded that allergy in tropical eosinophilia is of the infection-allergy type, the eosinophils having a special affinity for tissue infiltration. It has already been recorded by CHAUDHURI and CHAKRAVARTI (*Proc. 36th Indian Sci. Congress*, Part III, 1949, p. 186) that there is an increase of the globulin content of the blood in some patients. The role of the suprarenal cortex in the regulation of eosinophil level in the circulating blood is well recognized, although the precise *modus operandi* is uncertain, but the therapeutic effect of adrenocortical hormones in tropical eosinophilia is transitory only.

Philip Manson-Bahr

DANARAJ, T. J. **The Treatment of Eosinophilic Lung (Tropical Eosinophilia) with Hetrazan. (A Preliminary Report.)** *Proc. Alumni Ass., Malaya*. 1956, Sept., v. 9, No. 3, 172-87, 3 figs. & 10 charts. [18 refs.]

The true aetiology of pulmonary eosinophilia remains obscure, but arsenic has been considered a specific, albeit with limitations, and the response to arsenic, first noted by WEINGARTEN in 1943 [this *Bulletin*, 1943, v. 40, 407], served to distinguish this condition from other forms of eosinophilia. There has hitherto been no response to other drugs, including the antibiotics, in the author's experience.

A group of 150 patients with pulmonary eosinophilia studied by the author in 1951 were mostly Indians whose presenting complaints were cough with dyspnoea. Hepatomegaly and lymphadenopathy were not features, but as shown by X-rays increased striations and mottled shadows in the lungs were characteristic. The 10 patients in the present series were all Indian males in whom the symptoms were most distressing at night.

The author used diethylcarbamazine in doses generally recommended

for the treatment of *Ascaris lumbricoides*—12 mgm. per kgm. daily for 4 days. This was given in divided doses—200 mgm. thrice daily—and the course was not repeated. In one patient only was any other symptomatic treatment given. The decrease in the eosinophil count was considered the best indication of the effectiveness of the drug.

All patients were observed in hospital during the period of treatment and for a subsequent fortnight. They were then supervised as out-patients weekly for 2 months and then at monthly intervals for 3 months, blood examinations being made on each visit. A radiological examination of the chest and an estimation of erythrocyte sedimentation rate [ESR] were made before treatment and 1 week or 3 weeks after its completion.

Improvement in symptoms was noted by all the patients about the second or third day from the beginning, and progressed steadily, till by the end of the first week there was complete relief in 4 patients and only a residual cough in 6. Further improvement then occurred in these 6 during the second week and by the tenth to fourteenth days they, too, were free from symptoms. The nights were restful and sleep undisturbed.

An immediate and rapid fall in the number of circulating eosinophils began on the second day after the beginning of treatment and continued throughout the first 10 days in 8, but in 2 there was an immediate rise followed by the same rapid fall. Counts below 5,000 cells per cmm. were reached by the fifth day in 3 cases and by the ninth to the eleventh in the remaining 7. Then a further but more gradual decrease occurred to counts below 2,000 per cmm. The total period of observation after treatment in each case was 5 months. The fall in the eosinophil count coincided with a decrease in the total leucocyte count. The erythrocyte sedimentation rate which was elevated in 8 showed a decrease to normality in 4, when examined 1 week and 3 weeks after cessation of treatment. The final ESR at the end of the period of observation was normal in all. The X-ray pictures taken one week after cessation of treatment showed a distinct and marked improvement, the striations becoming less prominent with clearing of the pulmonary shadows. Further improvement was noted in films taken 3 weeks after cessation of treatment.

It was concluded that treatment with diethylcarbamazine resulted in complete cure in all 10 patients. [This claim is amply vindicated by the 10 graphs accompanying this paper which show clearly the instantaneous effects of diethylcarbamazine.]

[This is a fine piece of work in which the results are clear-cut. The underlying aetiology is still obscure, but this discovery is bound to open up many ramifications and other lines of research. The Indian literature reveals 2 previous references to the use of diethylcarbamazine: GANATRA and LEWIS (*Ind. J. Med. Sci.*, 1955, v. 9, 672) and CHAUDHURI [above]. The first noted complete clinical relief in 11 of 13 patients after 13 mgm./kgm. daily for 4 days and the latter remarked that it was "fairly effective" in 10 out of 12 patients on a daily dosage of 600–800 mgm. for 7–10 days.]

Philip Manson-Bahr

MOODY, M. D., GOLDMAN, M. & THOMASON, Berenice M. **Staining Bacterial Smears with Fluorescent Antibody. I. General Methods for *Malleomyces pseudomallei*.** *J. Bacteriology*. 1956, Sept., v. 72, No. 3, 357-61, 1 fig. [18 refs.]

Agglutinating antisera against *Malleomyces pseudomallei* [*Pfeifferella whitmori*] were prepared, the globulin fractions concentrated and conjugated with fluorescein by the Coons and Kaplan technique. These conjugated antisera agglutinated the homologous organism to high titre, but showed weak cross-agglutination of *M. mallei* [*P. mallei*]. When *M. pseudomallei* was examined after staining with the conjugated globulin under the ultra-violet microscope in air-dried viable and non-viable smears or smear fixed by heat, methanol or formalin, the bacterial cells showed bright fluorescence. This reaction showed almost complete immunological specificity (the only other organism of the panel tested which showed staining was *M. mallei*). Inhibition of this staining reaction by unlabelled globulin was not, however, conclusively demonstrated. It is suggested that rapid identification of organisms in routine bacteriological laboratories might be undertaken in the future by use of a wide range of organism-specific fluorescein-labelled antisera.

J. Swanson Beck

THOMASON, Berenice M., MOODY, M. D. & GOLDMAN, M. **Staining Bacterial Smears with Fluorescent Antibody. II. Rapid Detection of Varying Numbers of *Malleomyces pseudomallei* in Contaminated Materials and Infected Animals.** *J. Bacteriology*. 1956, Sept., v. 72, No. 3, 362-7, 4 figs.

With the method described in the previous paper, it is shown that *Malleomyces pseudomallei* [*P. whitmori*] can be demonstrated when present in very small numbers either alone or in the presence of contaminants, in experimentally seeded soil and from surfaces sprayed with suspensions of the organism. It was also readily demonstrated in the tissues of experimentally infected animals.

J. Swanson Beck

PARASITOLOGY: GENERAL

WIADOMOŚCI PARAZYTOLOGICZNE. Warsaw. 1956, v. 2, No. 5, Suppl., 276 pp. English summaries. V Zjazd Polskiego Towarzystwa Parazytologicznego Warszawa, 14-17.10.1956 r. [5th Congress of the Polish Parasitological Society, Warsaw, 14th-17th Oct., 1956]

There were 115 papers presented at this Congress, which was divided into sections on medical parasitology (51 papers), veterinary parasitology (28 papers) and general parasitology (36 papers).

The papers in the first section, which are those of special interest to readers of this *Bulletin*, include such subjects as amoebae, *Giardia*, helminths, mosquitoes, fleas, lice, intestinal parasitism, chemotherapy, *Pneumocystis* and toxoplasms. There were 12 papers on the last-named subject.

Abstracts of these papers are given and these are written in Polish, but in almost every case an English summary is provided, so that the substance of each paper is available to those who do not read the Polish language.

H. J. O'D. Burke-Gaffney

VALENTINČIČ, M. Nekaj o črevesnih parazitih v Sloveniji. [**Intestinal Parasites in Slovenia**] *Zdravstveni Vestnik*. Ljubljana. 1954, v. 23, Nos. 11/12, 312-16, 2 figs. [17 refs.] English summary.

A survey of the incidence of intestinal parasites in schoolchildren in Slovenia was carried out in 1953 by the Institute of Parasitology of the Serbian Academy of Science, and the helminthological findings are reported in the present article together with the results of an investigation carried out by the author in Ljubljana in 1950. Of 861 children aged 3-15 years attending schools in Ljubljana 469 were infected with *Ascaris lumbricoides* and 65 with *Trichuris trichiura*; the incidence of infection was higher in children living on the outskirts of the town where hygienic conditions were less satisfactory. In the investigation of 1953, 749 of 769 children (97.4%) attending schools in Ljubljana and other towns were infected; *Enterobius vermicularis* was present in 686, *Ascaris lumbricoides* in 460, and *Trichuris trichiura* in 347. The incidence of threadworm infection was 84.4% of 412 children examined in Macedonia, 74.8% of 543 in Metochia, 64.3% of 370 in Bačka, and 89.2% of 769 examined in Slovenia. The incidence of infection with *Ascaris lumbricoides* in the same groups in the 4 provinces ranged from 2.7 to 87.2%, and the incidence of *Trichuris trichiura* infection ranged from 19.6 to 53.1%.

D. J. Bauer

OKPALA, I. **The Incidence of Intestinal Parasites among School Children in Lagos (Nigeria)**. *West African Med. J.* 1956, Dec., v. 5 (n.s.), No. 4, 167-70.

A school medical officer in Lagos, Nigeria, arranges for the periodical parasitological examination of specimens from schoolchildren.

The present paper is a record of direct microscopic examination of the stools of 4,759 African pupils aged 10 to 22 years, in 44 schools in Lagos, between 1951 and 1955. The number of students from individual schools examined varied from 13 to 310 throughout the period and the number of schools from which they came were, respectively, 34, 32, 11, 16 and 13 in the 5 years.

The results are shown in 2 tables. The percentage of boys infected with intestinal parasites was 86.3 and of girls 83.4. The percentages varied from year to year, with a slight increase from 84.4% to 94.6%, and from school to school, where it was 53% to 100%, but usually above 80%.

The commonest infections were *Ascaris* (73.4%), *Trichuris* (38.9) and hookworms (14.9%). Multiple infections were common. It is satisfactory to note that *E. histolytica* infection was only 0.4%.

The author discusses the probable spread of these infections, and notes the common factors—insanitary conditions in some living quarters, neglect of personal hygiene and the presence of food-hawkers. Only some of the schools have their own canteens and the author advocates the medical examination of food-handlers, and, preferably, the replacement of itinerant food-hawkers by modern hygienic restaurants and canteens. He also rightly wonders, in view of the absence of any evidence of decrease in the incidence of these parasites during the 5 years, whether adequate treatment has always been carried out.

H. J. O'D. Burke-Gaffney

WATSON, J. M., BALIKIAN, G. & ABDEL KERIM, R. **The Effect of some Environmental Factors on the Incidence of Intestinal Parasitism in Lebanon.** *Lebanese Med. J.* 1956, May, v. 9, No. 3, 272-306, 1 map & 3 charts. [11 refs.]

Little accurate information is available concerning the incidence and distribution of intestinal parasites in Lebanon. This paper reports the findings of a survey throughout the country based on the examination of single stool specimens from 2,808 individuals. A table records the species of intestinal protozoa and helminths encountered and their infection rates, and the general conclusion is drawn that the incidence of helminth parasites is lower than the world average except in the case of *Taenia saginata*. Protozoal parasitic infections are near or higher than the world average. The findings are significantly higher except for whipworm and hookworm than those of previous workers in Lebanon [this *Bulletin*, 1932, v. 29, 755; 1934, v. 31, 373] probably because of improved methods of examination.

The investigation of the effects of environmental factors on infection rates gave some interesting results though it is not claimed that the correlation was direct or causative. Ankylostome infection was confined to the coastal plain, protozoal infection was most common in its southern part and helminthic infection generally was more common in the northern part of the country. Increasing altitude caused a diminishing incidence of helminth infection, except for *Ascaris lumbricoides* and *Hymenolepis nana*, but among protozoal parasites only *Entamoeba histolytica* and *Iodamoeba bütschlii* became scarce at 1,250 m. Dry and northerly exposures were less favourable to helminths than the warm and humid southern aspects. Geological formations had some effect on

helminths but not on protozoa. Stream and river water supplies tended to be more frequently faecally contaminated than springs, wells or cisterns and to be associated with higher incidences of intestinal parasites. Where sanitary facilities were common more persons were free of intestinal parasites and the incidence of *Ancylostoma duodenale*, *Strongyloides stercoralis* and *E. histolytica* was lower. In areas irrigated by running water *A. lumbricoides* was common, but in rain-irrigated areas *Trichuris trichiura* and *S. stercoralis* were rare, probably because of the long hot and dry season. Piped irrigation from springs was associated with greater freedom from all intestinal parasites. Where garbage was used as a fertilizer, *A. lumbricoides* and *T. trichiura* were more common, while *S. stercoralis* and *Trichostrongylus* infections were associated with the use of camel dung. Goat and sheep dung do not tend to keep the soil moist and do not facilitate the free-living stages of helminths. Hookworm infection was associated with orange and pomegranate growing rather than banana culture. The incidence of *A. lumbricoides* and *E. histolytica* was higher in farming communities than others. Intestinal parasitism appeared definitely to lower standards of health in communities where the general standard of health was poor. The availability of a medical practitioner was correlated with a lower incidence of hookworm and *E. histolytica*, probably because infected persons sought treatment. T. H. Davey

WELLS, W. H. **A Cursory Survey of Human Intestinal Parasites in the Nomadic People of Southern Turkey.** [Research Notes.] *J. Parasitology*. 1956, Oct., v. 42, No. 5, 535.

During 5 days in July–August 1954, the author examined 224 specimens of urine and 118 of faeces from semi-nomadic males of Kurdish-Arabic descent in the arid country near Urfa in Turkey. This region is only 30 miles north of the area of Syria where PIPKIN and RIZK found a focus of vesical schistosomiasis [this *Bulletin*, 1949, v. 46, 845].

The urine specimens were all negative for *S. haematobium*. In the stools, all but 20 contained protozoa and all but 8 contained helminthic ova. *E. histolytica* was found in 9%, *Endolimax nana* and *Iodamoeba bütschlii* in 12% and 16%, *Ascaris* in 68%, *Trichuris* in 72%. In 20% *Taenia* eggs were found. Hookworms were found in only 4%.

H. J. O'D. Burke-Gaffney

LESSER, E. **Parasitism in Korea.** [Research Notes.] *J. Parasitology*. 1956, Oct., v. 42, No. 5, 515.

Between 1954 and 1955, 268 Korean and 601 United Nations subjects (90% American) were examined for intestinal parasites in a U.S. Army hospital in the Seoul-Inchon area of Korea. A single faecal specimen was

examined by a concentration method: the stools were usually too old for the detection of trophozoites, so that a low prevalence of protozoal infection was found, *e.g.*, *E. histolytica* was recorded in 8.6% of Korean and 3.7% of U.N. subjects.

The results are listed. In all, 98.5% of Korean and 22.5% of U.N. subjects harboured parasites. The commonest parasites were *Trichuris*, hookworms and *Ascaris*, which accounted for 87%, 64% and 46% of positive findings in Koreans and 6.3%, 6% and 1% in U.N. subjects. Other findings in Koreans included *Clonorchis* (23%) and *Metagonimus* (12%).

It is concluded that the high incidence of parasitism in Koreans is not a serious threat to the health of U.S. troops under peacetime conditions, because of the difference in living conditions.

H. J. O'D. Burke-Gaffney

JEFFERY, G. M. **Intestinal Parasites in a Georgia Mental Hospital.**

[Research Notes.] *J. Parasitology*. 1956, Oct., v. 42, No. 5, 553-5.

The author refers to a few studies on intestinal parasites in Georgia, U.S.A. [this *Bulletin*, 1937, v. 34, 511; 1941, v. 38, 588] and a comparative study in South Carolina [*ibid.*, 1944, v. 41, 408].

He then tabulates results of examinations of a single stool specimen in 922 newly admitted white female patients in the Georgia State hospital, in 92 employees who had been in that institution for at least a year and in 120 new employees and their families. The results are compared with some of the previous studies.

Infection rates were fairly low (17.5%, 31.5% and 35.0%, respectively, in the 3 groups). In general, employees were more heavily infected than newly admitted patients; *e.g.*, *E. histolytica* 3.2% and 1.8%, *Endolimax* 8.7% and 7.2%, hookworms 7.6% and 2.4%.

It is pointed out and confirmed by reference to other studies that the incidence of intestinal parasites tends to increase very greatly in patients of long residence.

H. J. O'D. Burke-Gaffney

CALVÓ FONSECA, R. Estudio del parasitismo en nuestro medio, visto principalmente como causa de mortalidad. [**Study of Parasitism in Cuba considered chiefly as a Cause of Death**] *Rev. Kuba Med. Trop. y Parasit.* 1955, July-Dec., v. 11, Nos. 7/12, 57-63. [20 refs.]

In 1953 the Finlay Institute, Havana, published the results of a survey instigated by the Cuban Ministry of Health as part of an antiparasitic campaign. Faecal samples were examined from 52,133 inhabitants of 295 villages in 63 *municipios*. Parasites were found in 86.5% of the samples, *Trichuris trichiura* in 51.09, *Ascaris lumbricoides* in 26.6 and hookworms in 26.52%. *Necator americanus* was widespread; in more

than 100 villages the incidence of infection was between 20 and 50%, in 24 villages between 50 and 60, in 17 villages between 60 and 70, and in 4 villages over 70%.

A table gives the total death rates recorded in Cuba during 14 years 1934-40 and 1943-49 and the number of deaths attributed to intestinal parasite infections. It is evident from the figures that death registration in Cuba is very deficient. During these 14 years 417 deaths were ascribed to amoebic dysentery and 481 to ankylostomiasis.

The paper ends with a discussion of the manner in which intestinal parasitic infections, even those of low pathogenicity, may cause death.

The antiparasitic campaign is to be intensified by increased efforts to ameliorate sanitary conditions.

Norman White

DOMINICZAK, K. Pneumocystoza na terenie województwa szczecińskiego.

[**Pneumocystosis in the Szczecin District**] *Wiadomości Parazytologiczne*. Warsaw. 1956, v. 2, No. 6, 349-55, 3 figs. on 2 pls.

The English summary appended to the paper is as follows:—

“ In connection with 6 cases of interstitial plasma cell pneumonia in infants caused by the parasite *Pneumocystis carinii* and discovered in dissection material at the Medical Academy (Pathologic Anatomy) in Szczecin, the author discusses the epidemiologic problems of pneumocystosis and comes to following conclusions:

“ 1) The disease concerns infirm, sick or prematurely born infants and occurs in the first months of their life;

“ 2) infants fall ill who have been staying in closed hospitals;

“ 3) rural environment and summer time seem to contribute to the infections;

“ 4) the small quantity of cases suggests but a little invasion of the parasite.”

JANAH, SOVA, BHOWMIK, D. N. & CHAUDHURI, S. N. **Turbidimetric Determination of Protozoal Agglutination.** *Ann. Biochem. & Exper. Med.* Calcutta. 1956, Apr.-May-June, v. 16, No. 1, 23-8, 3 figs. [14 refs.]

“ A simple turbidimetric method for the quantitative agglutination of protozoa has been described. The data so obtained have been compared with those of the standard dilution method.”

ENTOMOLOGY AND INSECTICIDES : GENERAL ZOOLOGY

[Papers on the toxic effects of insecticides in man are abstracted in the *Bulletin of Hygiene* under the general heading of Occupational Hygiene and Toxicology.]

ADAM, J. P., RICKENBACH, A. & HAMON, J. Présence en Afrique Occidentale Française de *Anopheles macmahoni* Evans 1936. [**Presence of *Anopheles macmahoni* in French West Africa**] *Bull. Soc. Path. Exot.* 1956, July-Aug., v. 49, No. 4, 674-6, 1 pl.

ADAM, J. P. & MATTINGLY, P. F. Note sur la morphologie et la biologie d'*Anopheles (Neomyzomyia) smithi* var. *rageaui* Mattingly (P.F.) et Adam (J.P.) 1954. [**Note on the Morphology of *Anopheles (N.) smithi* var. *rageaui***] *Bull. Soc. Path. Exot.* 1956, July-Aug., v. 49, No. 4, 734-47, 5 pls.

ADAM, J. P., HAMON, J., RICKENBACH, A. & LIPS, M. I.—Description du male et du pharynx de la femelle d'*Anopheles brohieri* Edwards 1929 et *A. hancocki* var. *masseguini* Hamon 1954. II.—Étude des affinités existant entre *Anopheles hancocki*, *A. hancocki* var. *masseguini*, *A. brohieri*, *A. theileri*, *A. seydeli*. [**I. Description of the Male and of the Female Pharynx of *Anopheles brohieri* and *A. hancocki* var. *masseguini*. II. Study of the Relationships between *Anopheles hancocki*, *A. hancocki* var. *masseguini*, *A. brohieri*, *A. theileri*, *A. seydeli***] *Bull. Soc. Path. Exot.* 1956, July-Aug., v. 49, No. 4, 747-58, 5 pls.

HURLBUT, H. S. & WEITZ, B. **Some Observations on the Bionomics of the Common Mosquitoes of the Nile Delta.** *Amer. J. Trop. Med. & Hyg.* 1956, Sept., v. 5, No. 5, 901-8.

In light trap collections of mosquitoes made in 3 villages north of Cairo *Culex antennatus* was the commonest mosquito, and this species together with *C. univittatus*, *C. pipiens*, *Aedes caspius* and *Anopheles pharoensis* formed just over 99% of the 16,362 specimens captured. The seasonal distribution of the commonest species is set out in 4 tables. About 5% of the total catch were females containing blood, and these were tested with absorbed antisera tested against sera of man, ox, sheep (or goat), horse (donkey or mule), dog and camel. *C. antennatus* was shown to have fed mainly on man, ox and horse. Most meals of *C. univittatus* were from unidentified mammals and those which were identified were mainly from man, dog, horse and birds. It is suggested that the unidentified mammals were mostly water buffalo. *C. pipiens*

from light traps were found to have fed mostly on man, a similar result to that obtained with *C. pipiens* captured in bedrooms. Bait traps with human bait captured relatively more *C. pipiens*, and traps baited with birds captured relatively more *C. univittatus*. The 3 commonest species of *Culex* were reared in the laboratory with mice as adult food, and a broth culture of *Bact. aerogenes* in Loeffler's blood serum as larval food. *C. antennatus* was found not to mate in the laboratory.

B. R. Laurence

LEWIS, D. J. **Some Mosquitos of the Sudan.** *Bull. Entom. Res.* 1956, Dec., v. 47, Pt. 4, 723-35, 16 figs. [25 refs.]

The occurrence and distribution of mosquitoes of the genera *Anopheles*, *Aedes* and *Culex* in the Sudan have already been considered. The main purpose of the present paper is to record the species of the other 11 genera of the Culicinae.

156 species, 2 subspecies and 7 varieties of Culicidae are known to occur in the Sudan. Taxonomic and other notes are given on several species. Distribution is shown on maps and some aspects of this subject are discussed.

The author draws attention to *Taeniorhynchus africanus*, *T. uniformis* and *Eretmapodites silvestris conchobius* as possible vectors of yellow fever in the southern Sudan.

H. S. Leeson

LEWIS, D. J. **The *Culex* Mosquitos of the Sudan.** *Bull. Entom. Res.* 1956, Dec., v. 47, Pt. 4, 703-21, 11 figs. [41 refs.]

Species of 5 subgenera of *Culex* that occur in the Sudan have been recorded in a previous paper. The main purpose of the present paper is to bring up to date the knowledge of the occurrence and distribution of members of the subgenus *Culex*. Additional notes are also included on some members of the other 3 subgenera.

45 species, 2 subspecies and 1 variety of *Culex* occur in the Sudan. Taxonomic notes are given on a few species, and new localities are recorded, mainly for the subgenus *Culex*. The known distribution is shown on maps.

Culex poicilipes and *C. antennatus* bite man near swamps; *C. pipiens* and *C. p. fatigans* bite man near houses and *C. univittatus* var. *neavei* sometimes bites man near its breeding places, though *C. univittatus* itself, the commonest and most widespread Culicine in the Sudan, scarcely ever attacks man. In Uganda, *C. poicilipes* and *C. univittatus* var. *neavei* are suspected of being concerned in the maintenance of yellow fever virus among wild monkeys during the dry season. Elsewhere, *C. pipiens* and *C. antennatus* are suspected of being vectors of West Nile virus; but in the Sudan *C. antennatus* is common in only a few localities of the disease; other mosquitoes occur in most of them. *C. pipiens* is a

vector of *Wuchereria bancrofti* in Egypt and *C. p. fatigans* is a vector in other parts of Africa but these mosquitoes are rare or absent in areas of the Sudan where the disease is known to occur. *H. S. Leeson*

NEWSON, H. D., BLAKESLEE, T. E., TOSHIOKA, S., SAKAI, M., WHEELER, C. M., SHIMADA, T. & AKIYAMA, J. **A Preliminary Report on the Laboratory Colonization of the Mosquito *Culex tritaeniorhynchus* Giles.** *Mosquito News*. 1956, Dec., v. 16, No. 4, 282-3.

IYENGAR, M. O. T. & MENON, M. A. U. **The Mosquitos of South Thailand.** With an Appendix by P. F. MATTINGLY. *Bull. Entom. Res.* 1956, Dec., v. 47, Pt. 4, 785-95, 8 figs. [13 refs.]

LANG, C. A. **The Influence of mating on Egg Production by *Aedes aegypti*.** *Amer. J. Trop. Med. & Hyg.* 1956, Sept., v. 5, No. 5, 909-14. [12 refs.]

Female mosquitoes were kept in cages and separated into 4 groups: those which had no contact with males; those which had contact before feeding; those which had contact after feeding; and those which had contact before and after feeding. All the females fed on human blood, and 86-88% of both mated and unmated engorged. After feeding, the females were kept singly, or single females were kept with two males. Significantly more eggs were laid by females which were in contact with males both before and after feeding. In the other groups some females laid few or no eggs. In the 3 groups which had contact with males most eggs (93-97% of total eggs) were laid during the first 7 days after feeding, whereas virgin females laid relatively fewer eggs over this period (59% of total eggs). This study emphasizes that more eggs are produced in the laboratory from female mosquitoes if the females are kept continuously in the company of males. *B. R. Laurence*

LANG, C. A. & WALLIS, R. C. **An Artificial Feeding Procedure for *Aedes aegypti* using Sucrose as a Stimulant.** *Amer. J. Trop. Med. & Hyg.* 1956, Sept., v. 5, No. 5, 915-20, 1 fig. [14 refs.]

Tests using different sugar solutions on saturated pads showed that most female *Aedes aegypti* engorge on sucrose solutions, fewer engorge on glucose and fructose solutions, and lactose is even less attractive. Glycerin was also found to be unattractive. Egg albumin with sucrose was attractive, whereas egg albumin combined with either lactose or water, was not. The average number of eggs laid by females fed on albumin and sucrose did not differ significantly from the average number of eggs

laid by females fed on blood. [These last results could have been reported in more detail.]

B. R. Laurence

RAHM, U. Zum Problem der Attraktion von Stechmücken durch den Menschen. [**The Attraction of Mosquitoes for Human Beings**] *Acta Tropica*. Basle. 1956, v. 13, No. 4, 319-44, 17 figs. [37 refs.]

The factors attracting mosquitoes to bite man were investigated in groups of 100 female *Aedes aegypti*, fed on blood 5 or 6 days previously and deprived of sugar-water for 48 hours before the test. The mosquitoes were confined in a 45-cm.-cube cage with a glass front and mesh sides. The "bait", a human arm (or an artificial arm), was placed under a gauze strip on the floor; in some tests two arms were used, under parallel strips, for comparison. The artificial arm was a glass cylinder filled with hot water and wrapped in damp towelling. The human subjects were 5 men and 5 women, all Europeans between the ages of 20 and 30. In each experiment, mosquitoes attempting to feed were counted 10 times, at intervals of one minute. Results were generally fairly consistent with a given arrangement throughout each day, but varied from day to day according to weather and unknown conditions.

BROWN [this *Bulletin*, 1952, v. 49, 323] had found, in field tests with "robots", that dry warm air containing CO₂ was attractive. However, in these tests, streams of air with 10 or 50% CO₂ were not attractive and 100% of this gas was slightly repellent. Furthermore, some measurements of CO₂ given off from the skin surface proved the amounts to be negligible.

Temperature was probably important as the bait was more attractive when vertically below the mosquitoes than when the cage was turned on its side (stream of warm air rising). Measurements of temperature of hand and arm of the subjects showed considerable variation from time to time (28 to 35°C.) with the hand generally slightly warmer (av. 0.5°C.).

Humidity had an important synergistic effect on the attractiveness of a warm object. An artificial arm with a damp portion was very much more attractive than an adjacent dry portion. This apparently explained the greater attraction of human hands than the arms, since measurement indicated a considerably greater moisture output from the former.

Temperature and humidity, however, did not account for all the attraction of the human arm, since most natural arms were more attractive than the artificial one. (In a few cases the position was reversed.) This was presumably due to some odour. The attractiveness of human subjects varied from time to time, sometimes for obvious reasons (cold hands); sometimes obscurely.

Men were nearly always significantly more attractive than women. There were indications that some individuals were generally more attractive than others; but in direct comparisons between people of the same sex, the differences were rather inconstant.

J. R. Busvine

HESS, A. D. & QUINBY, G. E. **A Survey of the Public Health Importance of Pest Mosquitoes in the Milk River Valley, Montana.** *Mosquito News*. 1956, Dec., v. 16, No. 4, 266-8.

SMITH, G. F., GEIB, A. F. & ISAAK, L. W. **Investigations of a Recurrent Flight Pattern of Flood Water *Aedes* Mosquitoes in Kern County, California.** *Mosquito News*. 1956, Dec., v. 16, No. 4, 251-6, 1 fig.

BIDLINGMAYER, W. L. & SCHOOF, H. F. **Studies on the Viability of Salt-Marsh Mosquito Eggs.** *Mosquito News*. 1956, Dec., v. 16, No. 4, 298-301.

“Laboratory evaluation of winter-collected soil samples from salt marshes near Savannah, Georgia, indicated that eggs of *Aedes taeniorhynchus* and *Aedes sollicitans* show little loss in viability over the period December 1 through June 1. Subsequent to early June, the percentage of viable eggs decreased markedly.”

WIRTH, W. W. & BOTTIMER, L. J. **A Population Study of the *Culicoides* Midges of the Edwards Plateau Region of Texas.** *Mosquito News*. 1956, Dec., v. 16, No. 4, 256-66, 10 figs. [10 refs.]

SAILER, R. I., MARKS, E. P. & LIENK, S. **Notes on *Culicoides* in Alaska (Diptera, Heleidae).** *Mosquito News*. 1956, Dec., v. 16, No. 4, 270-78, 4 figs.

See also p. 466, MUIRHEAD-THOMSON, **Communal Oviposition in *Simulium damnosum* Theobald (Diptera, Simuliidae)**

SACCÀ, G. **Speciation in the House-Fly. I. Recent Views on the Taxonomic Problem (Diptera, Muscidae gen. *Musca*).** *Selected Scientific Papers from Istituto Superiore di Sanità*. Rome. 1956, v. 1, Pt. 1, 141-54, 5 figs. on 4 pls. [16 refs.]

Summaries are given in English, Italian, French and German. The author's English summary is as follows:—

“The results obtained up to the present from study of the taxonomic problems of the *domestica* group are summarized. The author has studied a large number of samples from different parts of the Old World from Finland to India, which had been attributed variously to the species *domestica*, *vicina* and *nebulosa*. These forms were completely interfertile,

and a statistical study of some of the characters used to distinguish the three forms showed an absence of morphological discontinuity between the different populations; the typical *domestica* form of North Europe and the Indian *nebulo* form are connected by a long graduated chain of intermediate forms. Experimental study of these characters showed them to be inherited, since each strain retains its morphological characteristics for a certain length of time, but also to be influenced to a considerable extent by the temperature of larval development. Furthermore, the most geographically and morphologically remote strains gradually lose their morphological peculiarities after a definite number of generations and tend to become assimilated to the local population. The author's tentative conclusion is that *domestica*, *vicina* and *nebulo* should be regarded as no more than geographical forms constituting a cline sensu HUXLEY.

"Some remarks are also made on the problem of *M. cuthbertsoni* PATTON. The present state of research may be summarized as follows.

"*cuthbertsoni* and *vicina* are sympatric and interfertile forms; the existence of isolation mechanisms must be admitted, since in the great majority of cases there is a sufficiently clear distinction between the two forms. But in the laboratory *cuthbertsoni* tends to lose a great part of its differential characters in the course of a few generations, and in the field it seems to be impossible to find it at all in winter.

"The results of a study now in progress on strains of *cuthbertsoni* obtained from Egypt and Central Africa will be published in a later paper."

KULESZA, J. & KRISTANEK, Eugenia. Przyczynek do selektywnego tepienia muchy domowej w środowiskach wiejskich. [**A Contribution to the Selective Destruction of House-Flies in the Rural Areas**] *Roczniki Państwowego Zakładu Hig.* Warsaw. 1956, v. 7, No. 6, 543-53, 6 figs. [17 refs.]

The English summary appended to the paper is as follows:—

"In the study attention was called to the specific aspect of the problem of combating flies in the rural areas which in practice leads to the necessity of employing such chemical agents and in such amounts which do not cause negative influence on bacterial flora of fertilizers and compost that are the source of breeding ground for flies, not destroying the useful insects and not causing rapid resistance.

"In the rural experimental centre very small amounts (2-10 g for 1 m²) of p-dichlorobenzene were employed in different farm places as the breeding ground for flies and on some parts of the sun-lighted or heated inner walls (about 20% of the total) of the living quarters, pig sties, cowsheds, etc. were sprayed by means of HCH and DDT. The last mentioned preparations by proper admixtures were made crystalline which is more desirable due to its activity and the rapidity of evaporation (or sublimation).

"For 4-6 weeks the flies were got rid of by employing 10-20% of the number of agents used before. It has been stated in the laboratory that the flies show definite unwillingness to lay eggs on the media containing slight amounts of p-dichlorbenzene (2-10 g for 1 m²). If the feeding places contain small amounts of p-dichlorbenzene flies rather avoid such places.

"In the course of the study a conclusion was drawn that in combating flies in the rural environment the number of agents used for frightening the flies away from the feeding places and breeding places should be enlarged and the number of contact poisons should be greatly reduced by utilizing photo and thermotropism of flies and by proper regulation of the activity of spraying folia."

KELLER, J. C., WILSON, H. G. & SMITH, C. N. **Bait Stations for the Control of House Flies.** *J. Econom. Entom.* 1956, Dec., v. 49, No. 6, 751-2.

"Experiments for the control of house flies (*Musca domestica* L.) were conducted in dairy barns, poultry houses, hog pens, and feed lots in Florida, and on farms in Kansas and Nebraska with bait stations designed to combine the best features of scattered baits with a more permanent type of application. The bait stations consisted of wooden tongue depressors stapled to paper coasters or pieces of screen coated with a slurry containing an insecticide, sugar, and sometimes agar, sand, or other ingredients.

"In general, baits containing 2% of Bayer L 13/59 or malathion gave excellent control where a sufficient number of stations were used and where sanitation was at least fair. Both Chlorthion and Am. Cyanamid 4124 at 2% gave good control in a limited number of tests. The baits were effective for 28 to 98 days."

ISTITUTO SUPERIORE DI SANITÀ. **Selected Scientific Papers.** Vol. 1, Pt. 1, 233 pp., numerous illustrations. 1956. Rome: Fondazione Emanuele Paternò, Viale Regina Elena, 299. Oxford: Blackwell Scientific Publications, 24-25, Broad Street. [L.5,000; 57s. 6d.]

The *Rendiconti Istituto Superiore di Sanità* is a well known scientific journal of high reputation, and its editors perform a valuable service by attaching summaries in English, French and German to each paper in it. The publishers have now gone further, and in the present volume they have printed 12 papers completely in English which are in fact complete translations of all the papers in the *Rendiconti Istituto Superiore di Sanità*, 1956, v. 19, No. 11. Many of these merit separate abstracts in this *Bulletin*, and these will appear in due course—they deal with insecticides, the taxonomy of *Musca domestica*, the genetics of that fly, and other entomological subjects.

The publication is beautifully printed, and for each paper summaries are included in Italian, French and German. The publishers and editors are to be congratulated on an imaginative effort to make valuable Italian research more widely known.

Charles Wilcocks

FARRELL, C. E. **Chiggers of the Genus *Euschöngastia* (Acarina: Trombiculidae) in North America.** *Proc. U.S. Nat. Museum*. Wash. 1956, v. 106, No. 3364, 85-235, 8 figs. & 21 pls. [Numerous refs.]

BUSVINE, J. R. **Resistance of Insects to Insecticides. The Occurrence and Status of Insecticide Resistant Strains.** Reprinted from *Chemistry & Indust.* 1956, 1190-94, 4 figs. [54 refs.]

A table summarizes the cases of insecticide resistance reported in insects since 1940 for which the author considers the evidence of resistance to be adequate. The list includes *Musca domestica*, *Culex fatigans*, *C. sollicitans*, *C. tarsalis*, *Aedes taeniorhynchus*, *A. nigromaculis*, *A. dorsalis*, *A. aegypti*, *Anopheles quadrimaculatus*, *A. sacharovi*, *A. sundanicus* and *A. gambiae*; *Pediculus humanus*, *Cimex lectularius* and *Blattella germanica*; and *Boophilus decoloratus* and *B. microplus*, besides several insects or mites of agricultural importance. References are given to the first record of resistance in each instance. The table indicates the insecticides to which resistance has been developed, the part of the world from which it is recorded (laboratory-induced resistance is excluded from this paper), and the kind of observations and experiments which have been made in each case. Over 80 papers have been published on resistance in the house-fly but not more than 4 on any one of the other species of medical interest.

The paper goes on to discuss various aspects of the problem, emphasizing the cautions to be observed in deducing resistance solely from field observations on an insect's abundance. Field work must be supported by laboratory tests in which the circumstances of the test should be as standardized as possible so that comparison can be made of insects tested at different times and from different parts of the world. Methods of exposing insects to test dosages of an insecticide can influence the dosage-mortality curve in a misleading way. Note is taken of the findings on biochemical mechanisms of resistance and the genetical principles involved in the phenomenon. In conclusion, an appeal is made to turn, in future, from too much concentration of research effort on resistance in the house-fly—an insect for which lack of control by modern insecticides is already an unfortunate reality—to investigations on the other very important insects which are now beginning to show resistance to insecticides.

D. S. Bertram

- WIESMANN, R. Das Problem der Insektizidresistenz. [**The Problem of Insecticide Resistance**] *Anzeiger f. Schädlingskunde*. 1957, Jan., v. 30, No. 1, 2-7. [73 refs.]
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LABORATORY PROCEDURES

- GÓMEZ RODRÍGUEZ, G. Una mezcla fijadora original para los estudios protozoológicos. [**New Fixative for Protozoological Studies**] *Rev. Med. Dominicana*. 1954, Apr.-May-June, v. 9, No. 2, 58-68, 8 figs. [14 refs.]

The author describes a new method for the fixation of smears of intestinal protozoa. The composition of the fixative is as follows: zinc sulphate (specific gravity 1180) 50 cc., saturated solution of mercury bichloride 50 cc., acetic acid 7.5 cc., 95% alcohol in sufficient amount to bring final specific gravity of the mixture to 1002 (usually 50 cc.).

The mixture is poured out into a Petri dish, and coverslips with smears of the material are fixed in it for 12-15 minutes, after which the dish is flooded with tap-water, and an equal volume of 95% alcohol is added to it, followed by a few drops of iodine, and a final wash in 70% alcohol.

The fixed smears are mordanted in 4% alum and stained with iron haematoxylin in the usual way, but their differentiation is carried out in a mixture of equal parts of alum solution and glycerin. Finally the preparations are washed in tap-water, dehydrated and mounted.

It is claimed that the new method is particularly suitable for the study of the cytology of amoebae and flagellates. [However, the photomicrographs illustrating the results are far from convincing.] C. A. Hoare

MISCELLANEOUS PAPERS

- PAN-MALAYAN SCIENTIFIC ADVISORY COUNCIL: MEDICAL & VETERINARY COMMITTEE. **Symposium on the Hazards of Imported Disease.** *Med. J. Malaya*. 1956, Sept., v. 11, No. 1, 20-80, 4 text figs. & 6 coloured figs. on 2 pls. [Numerous refs.]

The opening paper (*Ecological Aspects of Introduced Pests and Diseases* by J. R. AUDY, p. 21) of this symposium on the hazards of imported disease is concerned with the factors determining the fate of introduced organisms. The problem is one of general ecology in which the considerable advances made have often been overlooked by medical workers. A variety of important factors involved in the establishment and spread

of an introduced organism are discussed. Factors in the new environment which are important are either dependent on or independent of its population density. Acquired immunity in the host is an important density-dependent factor. Density-independent factors include new niches created by man, the degree of herding of other organisms into relatively dense patches, the degree of simplicity or complexity of the environment and critical climatic requirements. It is pointed out that the Malaysian rain-forest is a rich and stable environment and that its simplification, either by change of climate as a result of increasing distance from the equator or by clearing forest, leads to less stable communities with a greater degree of "herding" of single species. Development of a country changes its disease pattern and facilitates the introduction of various pre-adapted organisms. The suggestion is made that introduced organisms should be looked upon as "animal-weeds", and it is pointed out that a comparative study of the behaviour of disease agents in virgin and in artificially simplified communities would yield valuable results.

The second paper is on *Hazards of Importation with special reference to Helminths*, by A. A. SANDOSHAM, p. 33. It is well recognized that migration and travel can introduce diseases to new areas and that these may become a serious hazard to health. Establishment of helminthic disease in a new country occurs most readily in the case of parasites which require no intermediate host, and the world distribution of the two species of hookworm exemplifies this. Establishment of helminthic parasites requiring an intermediate host is less likely though it has occurred. Persons harbouring all 3 species of human schistosomes have entered and lived in Malaya but known vectors do not occur. Four local species of snails were exposed in the laboratory to *Schistosoma haematobium* from African troops but penetration by miracidia was not observed and dissections subsequently revealed neither sporocysts nor cercariae. *Wuchereria malayi* and *W. bancrofti* exist endemically in Malaya and the Pacific variety of the latter has been imported in Fijians but indigenous transmission of the last has not been encountered. Control is, however, being attempted by the periodic examination of the Fijians and the treatment of those found infected.

The increased speed of modern travel, in particular air transport, has rendered possible the transportation and survival of a greater diversity of insects than in the past. Insect quarantine services have been designed to prevent such spread, and this paper (*Insect Introduction Hazards affecting Singapore and Neighbouring Territories*, by M. LAIRD, p. 40) deals with aircraft and airport insect quarantine with special reference to the international airport on Singapore Island. In spite of control measures 19 species of 7 genera of mosquitoes have been found in surveys of the airfield. Large numbers of mosquito larval habitats of every kind exist, of which details are given.

Potential vectors of yellow fever, dengue, malayan and bancroftian filariasis were collected, and imported mosquitoes also could readily find a

suitable breeding place among the many types present. The introduction and establishment of the common malaria vectors from neighbouring territories would necessitate a complete reorientation of Singapore's malaria control. Other countries served by this airport risk the introduction of anophelines from Singapore, which though not concerned in local transmission are proved potential vectors.

Economic pests are more frequently transported by aircraft than are species of medical importance and it is estimated that about one-third of aircraft on international routes carry insects, many of which are alive on arrival. Though insecticidal spraying does not afford complete protection it is an essential safeguard. Rigid control measures against insects of actual or potential medical importance should be enforced within an agreed radius of all international airports, and spraying of aircraft should be continued as a supplementary measure. Recommendations are made for further studies in Singapore and for the elimination of mosquito larval habitats on its airfields; neighbouring territories should be consulted regarding a concerted approach to the problem.

This paper (*International Spread of Virus Diseases with special reference to Malaya*, by C. E. GORDON SMITH, p. 63) deals with the spread of virus diseases from country to country and their control, with special reference to influenza, poliomyelitis, smallpox and yellow fever. Influenza is probably endemic in Malaya and both A and B viruses have been isolated. Poliomyelitis cases treated in hospital have increased 6- or 7-fold in the last 10 years. It is believed that local polioviruses of low virulence immunize the population with few clinical cases and protect them against virulent strains introduced. It would be rash to vaccinate widely against the disease and so substitute a short-lived for a naturally acquired, long-lived immunity. Smallpox vaccination of infants has eliminated the disease since 1948 and its entry is controlled by insistence on possession of a valid vaccination certificate by travellers and by surveillance of persons from areas where the disease has been notified. Absence of yellow fever from Malaya is probably due to an ecological barrier in East Africa and to cross immunity conferred by indigenous viruses related to yellow fever. It is probable that the disease would spread widely if introduced. Measures employed to prevent this are vaccination of travellers from endemic foci, insecticidal spraying of aircraft arriving and mosquito control at airports. The elimination of *Aedes aegypti* from Singapore Island would limit spread from an incubating carrier who had been unsuccessfully vaccinated.

(*The Hazards of importing Diseases of Animals*, by C. W. WELLS, p. 71.) Many of the major tropical diseases of livestock are absent from Malaya though some of them were present before the last war. Only rigid sanitary routine can maintain this state, namely, quarantining of cattle and buffaloes from Thailand, the absolute or conditional prohibition of importation of certain species except from specified countries, and restrictions on the importation of animal by-products.

M. DORAISINGHAM (*Preventive Measures with special reference to Quarantine*, p. 76) argued that quarantine measures and regulations must be sufficiently resilient to afford protection to areas subject to special hazard on geographical grounds or because of inadequate social services. Recent trends in international quarantine practice have been towards relaxation of safeguards, which benefits particularly the countries with adequate social services and those in which epidemic foci exist and can spread. International quarantine would be unnecessary if all countries had adequate medical services and protective measures but few countries are in this category. An international certificate of immunization gives no guarantee that the possessor is in fact immune, and it is suggested that quarantine should be permitted in the case of all contacts of a dangerous infectious disease and of travellers arriving from infected areas within the period of incubation. Local health conditions should be improved and, as the only reliable method of control of yellow fever, the elimination of all local carrier mosquitoes was urged.

[This very stimulating symposium will be of interest to many medical workers in the tropics. They should read the papers in full because they cannot be summarized briefly.]

T. H. Davey

PETRAUSKAS, L. E. **A Case of Cone Shell Poisoning by "Bite" in Manus Island.** *Papua & New Guinea Med. J.* Port Moresby. 1955, Aug., v. 1, No. 2, 67-8.

[See this *Bulletin*, 1936, v. 33, 722.]

REPORTS AND SURVEYS

CONGO BELGE. Fonds Reine Élisabeth pour l'assistance médicale aux indigènes du Congo Belge. Rapport sur l'activité durant l'année 1955. [**Report of the Activities of Foréami during 1955**] 138 pp., numerous illustrations. [1956.] Brussels: 14, Square de Meeûs.

The appearance of this report coincides with the 25th anniversary of FOREAMI's foundation. The opportunity has been taken to give a detailed account of the organization's history, structure and methods. First, however, there is an obituary of the late Dr. Noel HIMPE.

After a mass health campaign in Lower Congo during its first 5 years of work, after which that area was healthy enough to be handed back to the general medical services, FOREAMI has concentrated its efforts in

Kwango, the poorest and most primitive part of the whole colony. Since the inclusion of the Van Hoof-Duren plan (to which further reference is made below) in the 10-year plan for the Belgian Congo, the permanent settlement of FOREAMI in Kwango has been decided.

The administrative organization, with headquarters in Léopoldville, consists of a medical director, assistant medical director, 2 assistant medical officers and 2 finance officers. The establishment for rural work (covering a population of 811,251) is 18 doctors and 21 medical auxiliaries and *agents sanitaires*. [It is presumed, though not stated in the report, that these are Europeans.] The zone of operations is divided into 7 sub-sectors, divided in turn into districts, making a total of 22 districts.

Exhaustive resurveying (*recensement*) of the population has been the fundamental principle enabling FOREAMI not only to master the great endemic diseases but also to contribute to general health education, development of medico-social work, and progress of demography. Periodic resurvey, originally made necessary by the need for early tracing of sleeping sickness cases, has now been extended to a number of other areas where trypanosomiasis is not endemic, and is applicable notably to venereal disease, malaria, yaws, leprosy, fungal and helminthic infections, and the stigmata of avitaminosis and nutritional disorders. It provides precise data of endemicity, contagiousness and mortality for each. The records so obtained are of the greatest value when deciding on prophylactic schemes.

All the population is recorded, by families, in each group of villages due for resurvey. The travelling teams, consisting of Congolese auxiliaries, are directed by a doctor or chief *agent sanitaire*. Usually, 3 *aides-infirmières* perform the microscopic examinations, another runs the travelling dispensary, while a clerk and 3 messengers make up the team. The survey, adapted for record making, permits only simple or collective treatments (as for helminthiasis), or treatment courses for endemic diseases, following rigid schedules (trypanosomiasis, yaws, non-contagious leprosy, syphilis, etc.). It is therefore not a complete medical service. Individual treatments, medical, surgical or obstetric, demand fixed treatment centres. According to the nature of the case, the centre to which it is directed may be the medico-surgical centre of the sub-sector or district, a main or simply a rural dispensary. The rural dispensaries, of which a district has 8 to 10, each with 12 beds, are placed at intervals of not more than 30 km. and run by a Congolese nurse, under the direct control of a chief *agent sanitaire*. At the latter's station, a main dispensary of 30 to 40 beds allows the centralization of sick persons, found by the rural survey or sent in from the rural dispensaries. In the absence of the *agent sanitaire*, whose main work is supervision of the field survey, the main dispensary is run by a nurse who has a diploma of government training. The main dispensary is responsible for the reception and distribution of stores for the rural dispensaries. In heavily populated districts a hospital replaces the main dispensary. At the headquarters of

the sub-sector is the main medico-surgical centre, where the chief medical officer of the sub-sector, who is responsible for all the activities therein, is assisted by one other doctor.

This, with some assistance from missions (specially in midwifery), completes the chain of district health establishments designed by FOREAMI. It is, in fact, the actual implementation of the Van Hoof-Duren plan. Effective implementation of much of it was delayed by lack of funds until the 5-year plan of 1948-52. Kwango is a poor area, with infertile soil and few natural resources, offering every possible obstacle to the improvement of communal health. Nevertheless, much has been accomplished. Trypanosomiasis has lost (to malaria and tuberculosis) its reputation as the chief scourge. The actual eradication of leprosy can be foreseen. Relapsing fever has become sporadic rather than endemic. The dysenteries are disappearing more and more from the returns of morbidity. Malaria, though ever present, now causes little infant mortality on account of weekly prophylaxis at infant clinics. The campaign against tuberculosis has entered a very active phase. Onchocerciasis, recently found to exist in severe form in some parts, is the subject of a special enquiry. Yaws is in process of disappearing. Venereal diseases, respiratory, skin and helminthic infections, and kwashiorkor are mentioned as being still very prevalent.

There follow sections on specific diseases.

Trypanosomiasis. Pentamidine prophylaxis is thought still to be the most effective weapon in areas where the disease is still active, but the use of tsetse control is increasing. In treatment, the tryparsamide-suramin combination is used almost invariably. To test for arsenic resistance (van Hoof's method), a single heavy dose of Tryponarsyl [tryparsamide] (60 mgm./kgm.) is given; the blood is re-examined 24 to 48 hours later. If the peripheral blood has been sterilized, a combined cure of 5 injections of Bayer 205 [Suramin] (20 mgm./kgm.) and 12 weekly injections of tryparsamide (40 mgm./kgm.) is prescribed, the 2 courses being given sometimes simultaneously, but more often in succession with the Bayer 205 course first. Progress is assessed by the results of lumbar puncture.

Malaria. The weekly administration of chemoprophylactics at infant welfare clinics is the main measure taken at present.

Tuberculosis. Travelling survey teams, with radiographic equipment, have been touring rural areas. Mantoux tests have revealed high positive percentages. A FOREAMI sanatorium is under construction. BCG vaccination already has been given in the schools and the areas where the mass X-ray survey has operated. Research into the effects of heat, light and age has shown that they have little effect on the vitality of the lyophilized vaccine used.

Leprosy. For the most part, leprosy patients get their treatment from the rural dispensaries, but leprosaria are maintained for severe cases.

Nutrition. "The work of the laboratory at Feshi, right in the heart of

the bush, is of university standard" [abstracter's translation]. References to published research are given. The work of the Père Damien Leprosy Section and the Reine Astrid Maternity and Child Welfare each contribute a section to the report. Finally, there are appendices on special activities (*e.g.*, pisciculture) and statistics.

[The report is a document of outstanding interest. In fundamentals, the ideas of FOREAMI mostly coincide with those of the French SGHMP and of the Medical Field Units of Nigeria and the Gold Coast. But those who have tried to organize field medicine elsewhere must salute FOREAMI's achievement of a balanced, comprehensive rural health service, with envious admiration of the sustained and practical government backing which has made this possible.]

B. B. Waddy

BOOK REVIEWS

SMART, John [M.A., D.Sc.]. **A Handbook for the Identification of Insects of Medical Importance.** With Chapters on Fleas by Karl JORDAN, F.R.S. and on Arachnids by R. J. WHITTICK, B.Sc. 3rd Edition. pp. xi + 303, 178 figs. & 13 pls. (3 coloured). 1956. London: British Museum (Natural History). [40s.]

The third edition of this very useful work on the insects (and acarines) of medical importance is a photolitho reprint of the second edition issued in 1948 [this *Bulletin*, 1949, v. 46, 300]. Bibliographical references have been brought more up-to-date and some small additions and corrections made to the text. Otherwise, it does not differ from the second edition in its scientific matter but the price, at two pounds, is double that of the second edition. This is regrettable although presumably inevitable; it is still remarkable value in the scope of its systematic treatment of important groups of the insects and in the detail of its text and illustrations of structure and diagnostic features of these and other groups. The book has reproduced well by the process used and retains its now familiar good qualities of production in print and illustration and convenience of size.

D. S. Bertram

STRODE, G. K., WHAYNE, T. F., WILLIAMS, L. L., JR., SAPERO, J. J. & SNYDER, J. C. **Health Hints for the Tropics.** (3rd revision.) *Suppl. to Trop. Med. & Hyg. News.* 21 pp. [15 refs.] 1956. Bethesda 14, Md.: National Institutes of Health.

This useful pamphlet has been revised since the issue of the second edition in 1951 [this *Bulletin*, 1953, v. 50, 467]. Most of the material remains as before, but parts have been rewritten. The section on anti-malarial drugs has been recast to include amodiaquine and pyrimethamine; 3 tables giving details of immunization have been omitted, since

they duplicate information given in another publication to which readers are referred, but the general information on immunization has been rewritten and slightly expanded. The section on insecticides now includes dieldrin.

There is one queer aberration:—" . . . Salt water bathing is usually safe, except in the case of beaches which are contaminated by fresh water streams or sewage outlets. In some parts of the tropics salt water beaches of the latter type are the source of infections by intestinal bacteria and by the blood flukes which cause schistosomiasis, a chronic disease which is difficult to cure completely." This cannot, surely, refer to the rare occurrence of swimmers' itch due to cercariae from marine snails [see LEIGH, *ibid.*, 1954, v. 51, 499]; it seems to refer to the common schistosomiasis, though such infection on sea-bathing beaches must be extremely rare.

Sunstroke remains, though it has outlived its day, but, on the other hand, there is no mention of prickly heat in the section on skin diseases.

Nevertheless, this remains a most useful and authoritative publication—short, clear and accurate.

Charles Wilcocks

NAUCK, Ernst Georg [Edited by]. **Lehrbuch der Tropenkrankheiten.**

[Text Book of Tropical Diseases] pp. viii + 432, 125 figs. 1956,

Stuttgart (14a): Georg Thieme Verlag, Herdweg 63. [DM. 64.—]

Professor Nauck has provided a text which is written with the clarity and authority of great personal knowledge and experience. The publishers have produced a fine book with clear typescript and beautifully reproduced charts, half-tone and coloured illustrations.

The book is divided into 11 major sections as follows: arthropods as vectors of disease; helminthic diseases; protozoal diseases; spirochaetal diseases; bacterial diseases; rickettsioses; virus diseases; mycoses; nutritional defects; miscellaneous diseases (including bartonellosis, trachoma, lymphogranuloma venereum, granuloma inguinale, tropical ulcer and rat-bite fever); and poisonous animals (general, snakes, scorpions, spiders).

Each of these formal sections contains an account of the relevant specific item. These carry on from one to another in the text without any clear division beyond headings in heavy type. This seems to the reviewer to be likely to lead at times to a little more confusion than would have followed a more conventional arrangement into chapters.

The author's views are expressed unequivocally and discussions of subjects are up-to-date and clear. There are very few textual references to the literature and those actually quoted are not given in detail and cannot therefore be followed up, which is surely a pity.

Among the many excellent accounts of tropical conditions in the book perhaps the best is that on malaria. This is divided into sections as follows: geographic distribution; aetiology and life history of the parasite.

in the mosquito and in man; the erythrocytic phases of the individual parasites (in which *P. ovale* is described within the section on *P. vivax*); transmission and epidemiology; pathogenesis and pathological anatomy; course—benign tertian, quartan and malignant tertian, mixed infections, special forms (cerebral, hyperpyrexial, algid, gastro-intestinal); clinical findings in special organs (heart and circulation, blood, spleen, liver, kidneys, lungs); malaria in children and “chronic or larval” malaria; immunity; diagnosis and differential diagnosis; therapy (quinine, the 8-aminoquinolines, mepacrine, the 4-aminoquinolines, proguanil, pyrimethamine, each treated separately); prophylaxis and suppression, prevention and control.

Certain features are described with refreshing originality. For example, in referring to the geographical distribution of malaria Professor Nauck has had the courage to attempt a summary of the present position in relation to recent widespread attempts at control and eradication. Black-water fever is dealt with separately as a complication of malaria.

Further detailed comment on the text is unnecessary. The general content is excellent and the only criticism the reviewer is prepared to make is that he detects a bias towards the biological rather than the clinical aspects of the subject.

This is a most important book which should find a place in the shelves of all serious students of tropical disease.

B. G. Maegraith

WILKIE, W. **Jordan's Tropical Hygiene and Sanitation.** 3rd Edition. pp. viii + 408, 122 figs. 1956. London: Baillière, Tindall & Cox, Ltd., 7 & 8, Henrietta Street, W.C.2. [12s. 6d.]

The continuing popularity of this textbook, which was first published in 1939, is demonstrated by the fact that a third edition has been required [see also this *Bulletin*, 1950, v. 47, 1142]. It is specially written for students studying for the Certificate of the Royal Society of Health for Sanitary Inspectors in the tropics, and therefore special emphasis is laid on conditions to be found in the tropics, particularly in Uganda. As in previous editions the course for the Certificate is covered, with the exceptions of anatomy, physiology and office routine.

Considerable revision and some additions have been made in the new edition, including for the first time a chapter on Health Education and Propaganda, and a glossary of technical terms which appears as an appendix. There are numerous new and additional text figures. The original plan of the book remains unchanged and the subject-matter is dealt with in 10 chapters which cover the needs of a health inspector in a tropical country. The text is necessarily concise and intended to be used in conjunction with lectures and practical tuition. Techniques are sometimes described in insufficient detail and further instruction and

demonstration would be needed to amplify them. At the end of each section a set of questions is provided.

In criticizing this book it has to be remembered that the syllabus has been laid down by the Royal Society of Health, and that the reviser, who has very wide experience of tropical public health, has had to work within the limits demarcated. The general point of view adopted is rather that of the urban than the rural hygienist, and more could have been included which would have benefited those working in rural areas, though it might not have been of value in the examination. There is, for example, no reference to ram-driven water supplies which are becoming popular in some rural areas of Africa, nor is there any mention of the Wilson method of composting. The section on building construction is excellent but little attention is paid to improving the African hut of wattle and daub. In the section on disposal there is no reference to artificial biological treatment of sewage, and in discussing rat poisons the use of Dicoumarin compounds is omitted. There are a few small errors, such as the recommendation that DDT should be used to control reduviid bugs, and the statement that pigs and goats probably act as a reservoir of *Trypanosoma gambiense*. A number of mistakes have been missed in proof-reading; for example, there are 5 misprints on p. 334 and a line appears to be missing at the bottom of p. 361.

Both in this and in previous editions short descriptions of a large number of communicable diseases have been included. A sound knowledge of the signs and symptoms of the pestilential diseases, and possibly of the notifiable diseases of African territories is needed by health inspectors, but it is doubtful whether the very abbreviated descriptions of the large number of communicable diseases is of much value to subordinate health staff. The principles concerned in their epidemiology and control have been given in the sections on ventilation, water, disposal, etc., and the only justification for specific reference to the signs and symptoms of individual infections would appear to be that the knowledge may be required at the examination. There is a good case for revising the examination syllabus in order to adapt it better to the tropical environment and to model it less closely on the western pattern of hygiene.

The criticisms made above are mainly directed to the syllabus which this book has to cover. Within this framework the book is excellent, clearly and simply written and with good diagrams and illustrations. It can be recommended as of real value to subordinate health personnel in Africa, and it is a worthy successor to, indeed an improvement on, previous editions.

T. H. Davey

NOTICES

ROSS INSTITUTE OF TROPICAL HYGIENE

Lay Course in Tropical Hygiene

To be held from 15th to 19th July, 1957

The annual course for laymen will be held by the Ross Institute this year from Monday, 15th July to Friday, 19th July inclusive.

The course is as far as possible arranged so that morning sessions provide a continuous course on malaria and its control, and in the afternoons other tropical diseases and problems are dealt with, such as hookworm, bilharzia, nutrition, housing and sanitation, and protection against heat.

It is intended for such people as estate and mine managers and their assistants, missionaries and all those whose work in the tropics makes them responsible for the health and welfare of others. Senior men will find the course of particular value owing to the many developments and great advances in knowledge of these subjects which have taken place in recent years.

There is no fee for the course.

It would be appreciated if agencies and firms would inform their managers and assistants that this course is being organised and encourage and assist them to attend. The names of those proposing to attend should be sent as soon as possible to the Organising Secretary, but amendments and additions may be made at any time up to the date of commencement of the course.

It would be helpful if intending students would state their occupation and the country or district to which they are going. This will enable the organisers to arrange the programme according to requirements.

Further information on the detailed arrangements will be sent to those who have enrolled about a month prior to the date of the course.

Further copies of this notice will be sent on request to:—

L. G. PONSFORD, *Organising Secretary*, Ross Institute of Tropical Hygiene, London School of Hygiene and Tropical Medicine, Keppel Street (Gower Street), London, W.C.1. Telephone:—MUSEum 3041-4. LAngham 7621-5.

The Editor regrets that the index for Volume 52 (1955) of the *Tropical Diseases Bulletin* will not appear before the middle of 1957 although he hopes that the delay in printing subsequent indexes will be reduced.

Subscriptions to the *Bulletin* include the cost of the index which is sent automatically to all subscribers to the relevant volume.